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DWIGHT FILLEY DAVIS, Assistant Secretary of War, the author of the accompanying article, is in immediate charge of the work which has as its object the industrial preparation of the Nation for any military emergency which may arise. He was born in St. Louis in 1879. He was graduated from Harvard University in 1900. Mr. Davis and Holcombe Ward won the international doubles tennis championship in 1899, 1900 and 1901.

Mr. Davis' prowess as a soldier was none the less striking than his capabilities as an athlete. He was awarded a Distinguished Service Cross for conspicuous bravery and gallantry in action at San Mihiel and in the Argonne. After the war, Mr. Davis embarked upon a political career. He entered the race for the Republican nomination for the United States Senate in Missouri, but was defeated by Selden P. Spencer. When Mr. Harding became president, he selected Mr. Davis as a member of the War Finance Corporation. He served with that body until his selection this year to be Assistant Secretary of War.

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General scheme of mobilization is complete—What the men in the mechanical field can do to help

The Plan for Mobilizing Industry

By DWIGHT F. DAVIS
Assistant Secretary of War

"IT IS pardonable to be defeated but never to be surprised." This is an ancient military maxim. It is intended to emphasize the essentiality of being prepared for anything that may develop in connection with war.

In the World War, the United States was in effect surprised. This was due to the fact that the country did not appreciate for one reason or another the tremendous requirements of munitions and other supplies needed by the present day army and especially the length of time and the amount of effort required to assemble the raw materials, fabricate them into issue items of such munitions and other supplies, and then deliver them to the army at the fighting fronts.

It is doubtful if the country sufficiently realizes the fact that in general man-power can be mobilized, trained, and placed in action on the fighting fronts nearly a year before munitions therefor can be fabricated and delivered to the firing line. Nor does the country fully realize that the American Army in the World War was dependent upon the Allies for the great part of its munitions supplies and that without such a source of supply the American Army, in spite of its 4,000,000 soldiers and in spite of the billions of dollars spent for the procurement of *American made munitions*, would have been practically impotent.

With a really remarkable appreciation of the fundamental causes which were responsible for the surprise that in a great measure hindered our efforts in the World War, the leaders in Congress and the administrative departments of the Government and in the industries have set out to make such adequate arrangements as will not again allow us to be found in such an unsatisfactory position. Congress passed a broad and far-seeing law in the National Defense Act of 1920. Very careful plans are being drawn for the purpose of accomplishing the objective sought by this law.

The phase of the war preparation with which my office is definitely charged relates to the mobilization of the nation's industries in order to meet the gigantic requirements placed upon them for the supply of probable war armies. While the planning has reached an advanced stage, much work remains to be done. The nature of the endeavor is such that full details cannot be made public but it may be said that literally scores of industrial leaders are co-operating actively and unselfishly with the War Department in the hope that industrial mobilization may be accomplished with a degree of promptness and at a cost commensurate with our peace time efficiency.

Much study is being given at this time to the capacity of the country to meet the probable war requirements and especially as to the best method of converting manufacturing plants from peace time to war time activities. If full advantage can be taken of conversion possibilities the number of new plants with the attendant loss of time, which it would be necessary to spend to erect such plants, can be reduced to a minimum. One of the great advantages of conversion is the fact that there is an existing organization. The management has all the avantages of intimate knowledge of the possibilities of the plant's facilities and of its personnel. Housing arrangements for the personnel already exist. Transportation facilities have been provided by the plant

and it has its own arrangements for securing power and raw materials, etc.

From a manufacturing standpoint, the most difficult problem which must be faced is the production of ordnance and aircraft. The peace time manufacture of the materials needed by those services is so insignificant in comparison with war time requirements that elaborate new facilities must be created for the emergency over and above converted facilities. It is possible however to determine in advance where these plants can be constructed and to have in readiness plans for their construction and operation.

The broad problem of economic use of transportation is likewise being studied. Realizing that transportation is one of the vital things in war, efforts are being made so to distribute the industrial war load as to cause the minimum extra burden on transportation. One of the ways in which this can be accomplished is by placing a manufacturing plant in a place where it has the easiest access to the necessary raw materials.

Power shortages at critical points during the last war have led to a very careful survey of the power situation. The Corps of Engineers at this time is making a careful study of the power possibilities of the United States so as to know the extent of the power resources of each individual district. In allocating work, it is planned to take due cognizance of such power resources.

Super-Agencies Get Under Way Slowly

It is admitted that super-agencies such as a War Industries Board, a War Finance Corporation, a War Trade Board, a Fuel Administration, must necessarily be created if we are to be called upon to make war on a large scale. During the last war, it took a long time to organize these super-agencies and co-ordinate their work with those of the existing executive departments. Full advantage is being taken of this experience and it is hoped that definite relationships will be available in concrete form the next time it becomes necessary to create them.

Definite studies are being made as to the relative essentiality of industries. It is recognized that few industries are non-essential but one of the most important things to know in case of war is the degree of the importance of each activity to the most efficient conduct of the war program.

It is fundamental in industrial preparedness that sufficient reserves of important items of supply be maintained in order to supply the army until new production can be developed and delivered to the firing line and this phase of the problem is likewise being studied.

Much thought is also being given the control of capital, the control of labor and the prevention of runaway markets in time of war. Since these questions are social as well as economic and materialistic, they involve vast problems of public education.

In dealing with problems of this magnitude, it is requisite that all patriotic citizens give them thought. Most industrial executives today were engaged in similar duties during the World War. They were in a position to see the mistakes of that period. They now are in a position to have particularly valuable thought on the whole national scheme of industrial mobilization. These ideas should be reduced to concrete suggestions and recommendations and submitted to the War Department for they may be of great help in working out a sound and complete solution.

One of the very important classes of work necessary for successful industrial mobilization is that of the machine shop. The American machine shops of all sizes did a wonderful job in the days of the World War. They are continuing it in times of peace by assisting, among other things, in the survey now being made of the nation's machine tool resources and its machining ability. We feel sure, of course, that their help will continue to be given in assisting in the preparation for future war even though we all hope such war will never come.

Welding High-Speed Tool Steel to Ordinary Shanks—Discussion

By Frank A. Hurst

THE article by W. J. Seibert, on "Welding High-Speed Tool Steel to Ordinary Shanks," on page 254 of the *American Machinist* is of interest, but I cannot pass it by without bringing forward some points that I contend are not justified by facts. It is a very optimistic statement to make that any user of 50 lb. of high-speed steel per week can save $1,820 a year. There are many factors entering into the high-speed steel tipping question that must be put on the debit side, and I know that many people have found the balance to be quite on the wrong side.

Those who have spent much of their time in actual cutting tests with high-speed steel will agree that the forged tool will, every time, give a much greater cutting efficiency than will a welded tool; this fact needs no explaining to the metallurgist. Is it, however, for purposes of comparison of the systems necessary to consider forging at all? Is it not a fact that in many of the most up-to-date shops all tools with the exception of very intricate shapes are formed on the grinder? Has not the tipped tool also to be ground?

A solid tool can be worn down much further than a tipped tool, so that you require several weldings to get the same life as one forged or ground nose. The "ordinary shanks" need preparation, as also the bit for tipping, if you are to get efficient tools, and there are failures in welding also to take into account. When the high-speed steel tip is getting well worn down and near the weld, you come into a material of coarse structure which is very apt to chip and cause extra grinding or breakage.

The writer of the original article also gives the heat-treatment necessary to get good results, stating that the matter is of vital importance. All this handling as compared with the handling of a piece of ordinary high-speed steel adds considerably to the cost, and is quite a complication to the small shop.

It will be interesting to have the opinions of others on this question; but I consider that the information given by Francis S. Walters in an article "Costs of Solid and Welded-Tip Tools," on page 767, Vol. 41, of the *American Machinist*, still holds good, and that taking into consideration all the facts of the case, the balance of expenditure on tools is still very much in favor of the solid tool. Though Mr. Walters deals with tipping, and Mr. Seibert with butt welding, I think the comparison made by the former will still apply. He found in experiment with twenty-four tools that on the tool-making and grinding alone he got $0.90 in favor of a solid tool, without taking into consideration other factors of efficiency previously mentioned.

Production Grinding Developments in the Automotive Industry

By OSCAR A. KNIGHT

Heavier, stronger and more accurate machines — Cam grinding—Use of the wide-faced wheel—Special attachments and machines — Crankshaft grinding machines

ADVANCEMENT and development in any art or science is brought about by necessity, and the developments in precision grinding in the automotive industry have been accomplished to meet the demands for greater production and refinement at less cost.

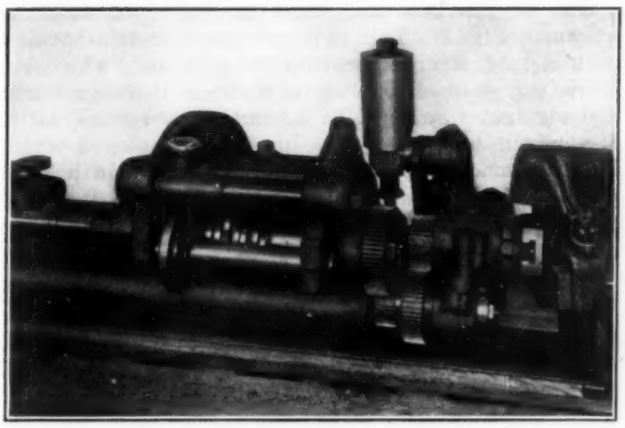


FIG. 1—CAM-GRINDING ATTACHMENT

To cover the developments that have been made in all classes of production grinding would consume too much time. Therefore, I will deal with only one class, namely, cylinder production grinding as performed within the automotive industry, with only a slight reference to other classes. Production grinding should also be classified as precision grinding because to secure the largest production of good ground-work the exact limits required for size and finish must be considered. Webster defines "precision" as "exact limitation, strict conformity to a rule or standard." This means that modern precision production grinding is always performed within exact limitation to some given rule or standard.

The progress made in production grinding during the past few years has been along the line of multiple-work grinding on such parts as piston rings and roller- and ball-bearing cups. It brought about the use of much wider grinding wheels to cover the entire surface of work that had formerly been ground with narrow wheels by the traversing table method. Along with the development of these operations came the cylindrical grinding of square and distributer cams; also square shafts, using oscillating cam-grinding attachments; piston relief grinding, with the same attachments; and two-wheel or double-wheel grinding for such parts as steering-knuckles and pinion shafts of different diameters or where the diameters are separated by some protrusion as in steering-gear worm-shafts.

Better Machines for New Operations

To perform these new operations more care has been taken to build machines that are stronger, heavier and more accurate so that operators can place greater dependence upon the operating mechanism than was possible with previous machines. Greater care has to be taken to balance the grinding wheels more accurately to overcome imperfections in finish and to eliminate excessive repairs on the grinding machine itself. At the same time, grinding-machine builders have devised means for bringing back into approximate running-balance wheels that have developed vibrations as they have worn smaller in their use.

New machines and special attachments have been put into use recently and the accompanying illustrations show some of the developments that have been made in production grinding in the automotive industry. It is

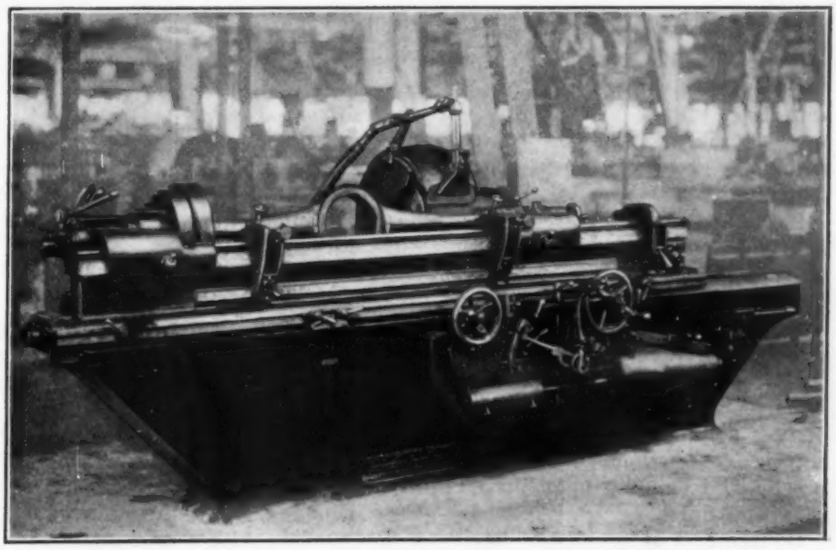


FIG. 2—GRINDING REAR AXLE HOUSING WITH WIDE-FACE WHEEL

A paper presented at the Production Meeting of the Society of Automotive Engineers, Cleveland, Ohio, Oct. 25, 1923.

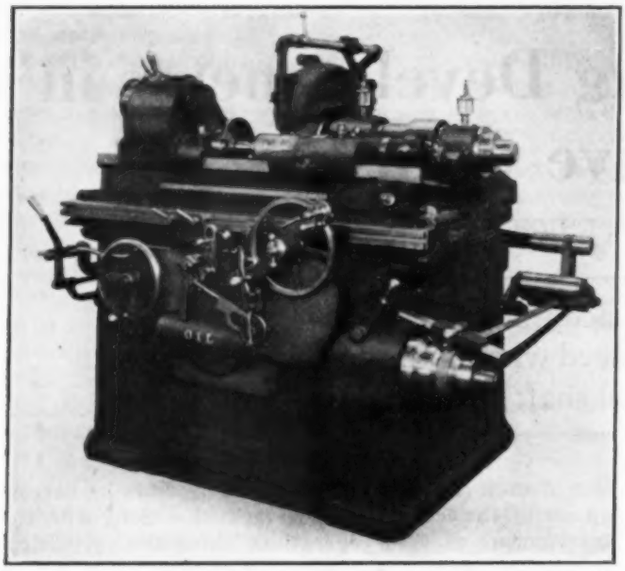


FIG. 3—PISTON GRINDING WITH SPECIAL ATTACHMENT

unfortunate that some of the very best examples of real progress could not be photographed for inclusion in the paper.

In the early days of the industry cams were made individually and pressed over a straight shaft and located in their respective positions by a Woodruff key. The attachment which ground these individual cams according to the shape required, oscillated in its movement. The shape was reproduced from a master cam contained within a case that formed part of the attachment.

Engineering progress caused a change in this part and whole camshafts with all cams forged in place were given to the grinding engineers. To meet this situation the integral cam-grinding attachment, which could be placed on the table of machines already being manufactured for other classes of grinding, was produced, and all the cams on a shaft were ground from the forging to the finished dimensions. This attachment, which is illustrated in Fig. 1 also oscillates in its movements and grinds to very close limits of accuracy all cams from 2 to as many as 24 on a single shaft, in accordance with the generated shape of the master cams.

Camshaft and Piston Grinding

Since this device was developed very little change has been made in its form but its accuracy, alignment and rigidity have been greatly improved so that today a whole camshaft having 12 individual cams integral with it is ground in about the same time as one individual cam by the original method.

Most automobile pistons are relieved around the wristpin hole, while a few makers desire an elliptically shaped piston to allow for heat expansion. This is accomplished with a loose cam or similar form of oscillating attachment. The relief or elliptical shape is reproduced from a master cam within the case at the side of the driving mechanism. By this method reliefs are ground in pistons at the rate of from 125 to 175 pistons per hour, while from 40 to 75 pistons that are elliptical throughout their entire length are produced per hour, depending upon their requirements for accuracy and finish.

Square and other shapes having a flat surface with connecting arcs and radii are now ground in attachments similar to that used for relieving pistons, as well as the attachment for automobile cams illustrated in Fig. 1.

With this method a square end on a transmission shaft measuring 1 in. square and 3 in. long can be ground at the rate of 65 pieces per hour, removing 0.020 in. of stock from the diameter to within a total limit of 0.001 in. for square, diameter and flat on all surfaces, the limit on the flat surface being from flat to 0.001 in. concave. This is a 90 per cent increase in production over the old method when using cup wheels and a hand-operated indexing mechanism. Many automobile companies have adopted this new method for grinding squares on transmission and pinion shafts, as well as brake cams for their rear axles.

The principal development in production grinding during the last few years can be attributed directly to the application of the wide-face grinding-wheel in its many phases. The automotive industry is largely responsible for its introduction and advancement. This method was used widely during the early stages of the World War for form-grinding shrapnel and other shells.

One of the best and most profitable examples is shown in Fig. 2. This is a common rear-axle housing with a long straight bearing on each end, which requires not so much a reflective finish as it does a round and straight bearing. To accomplish the work satisfactorily a new steadyrest has been employed which has overcome many difficulties encountered in holding this class of work round, as well as made it easier to grind heavy and out-of-balance pieces more accurately.

The feature of this rest that distinguishes it from the rest formerly used is the independent control of the horizontal and vertical motions of the work-shoes. The previous rests were fitted with one shoe that had to be discarded when the fixed arc had worn oversize.

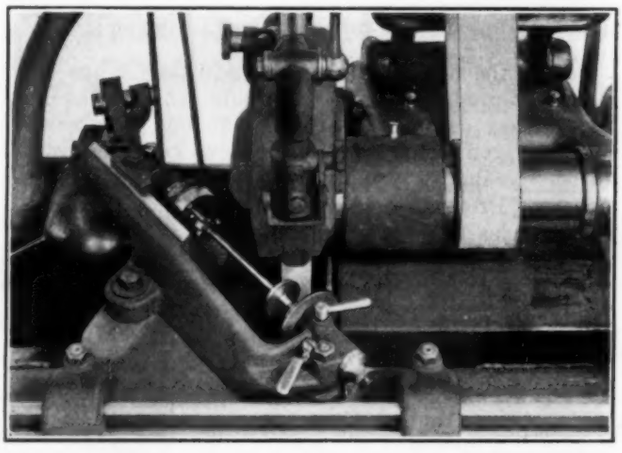
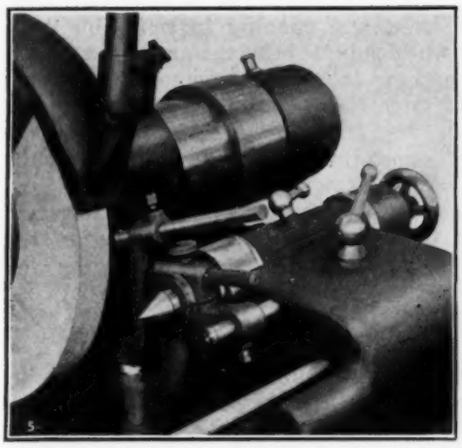


FIG. 4—ATTACHMENT FOR GRINDING SEATS ON VALVES

With independent motions of the work-shoes, as in this rest, the shoes give much longer service by virtue of a generous allowance for wear provided by their adjustability.

Housings such as that shown are now being ground on each end by the full-width wheel method at the rate of 20 and 21 pieces per hour, removing $\frac{1}{8}$ in. of stock to limits of 0.0010 in. for diameter and 0.0005 in. for roundness. This is done without any previous turning or snagging operation whatsoever.



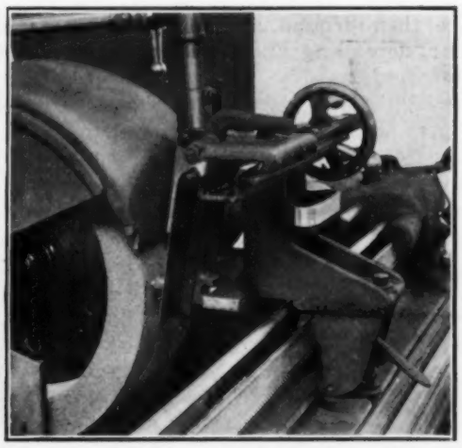


FIG. 5—RADIUS FORMING AND WHEEL TRUING DEVICE. FIG. 6—DEVICE FOR DRESSING THE WHEEL TO A GIVEN FORM

Another good example of the parts produced with a wide-face wheel is the rear-axle shaft. A middle spot was used in the old days as a steadyrest spot to prevent vibration, while the narrow wheel ground each end. Production was 12 ends per hour.

The application of the wide-face wheel removed the necessity for the spotting operation and increased the production obtained in 1913 to 46 ends per hour. Today on the same axle with the introduction of newer types of heavier machine, with the two-bearing independent-shoe steadyrest, the production has reached 800 to 1,000 ends in every 8-hour shift, which is an average of 100 to 125 ends per hour. These two examples of wide-wheel grinding are sufficient to show the advantages when applied to work not wider than 9¾ in. on the ground portion.

During the last year a device known as the wheel-spindle reciprocating attachment has been developed and supplied to automotive plants. When using the wide-wheel method of grinding, before the development of this attachment, it was necessary for operators to move the work table backward and forward by hand to break up the grain lines in the work. This movement of the work across the wheel also served to keep the cutting face wearing evenly. Both of these functions are now performed by this attachment, the use of which has decreased the number of truings required and the manual labor on the part of operators, increased the production and improved the quality of finish.

Great interest has been shown in the grinding of several diameters at one draw-in or straight-in cut, using two or more wheels mounted on a single wheel sleeve. When so equipped the machine is prepared to grind such work as steering knuckles, pinion shafts, some transmission shafts, small differential-case bearings and such work where protrusions separate two or more short diameters.

In the former days when one diameter of a steering knuckle was ground at a time, the hourly production was 50 complete knuckles. By the application of this new double-wheel method the production has been increased to 95 complete knuckles per hour. To accomplish this a special truing ring with positive stops has been applied to the wheel-feed gear and each stop set for truing its own wheel. When both are trued to their respective diameters a third stop is used as a positive in-feed locator for exact sizing. Many automotive plants have adopted this method of double-wheel grinding for work where this method is effective.

Grinding-machine companies have designed and built their machines with special-shaped tables, believing that in their respective particular shapes were to be found great advantages of rigidity and of retaining the correct alignment between the centers of the headstocks and footstocks. This made it difficult for them to design suitable special fixtures for special grinding jobs.

In the last year flat-table machines have been developed that consist of a swivel table made to a height to accommodate a user's special requirement. During the same period the grinding-machine builders have been requested to produce certain other special attachments to enable their customers to secure a larger production of certain kinds of work that can be finished best by grinding. One of these special attachments is an adjustable speed live-spindle headstock that is used for grinding such work as pistons and other open-end pieces and differential cross-members. When grinding pistons on this attachment, as shown in Fig. 3, the faceplate is removed and a special cone driver screwed

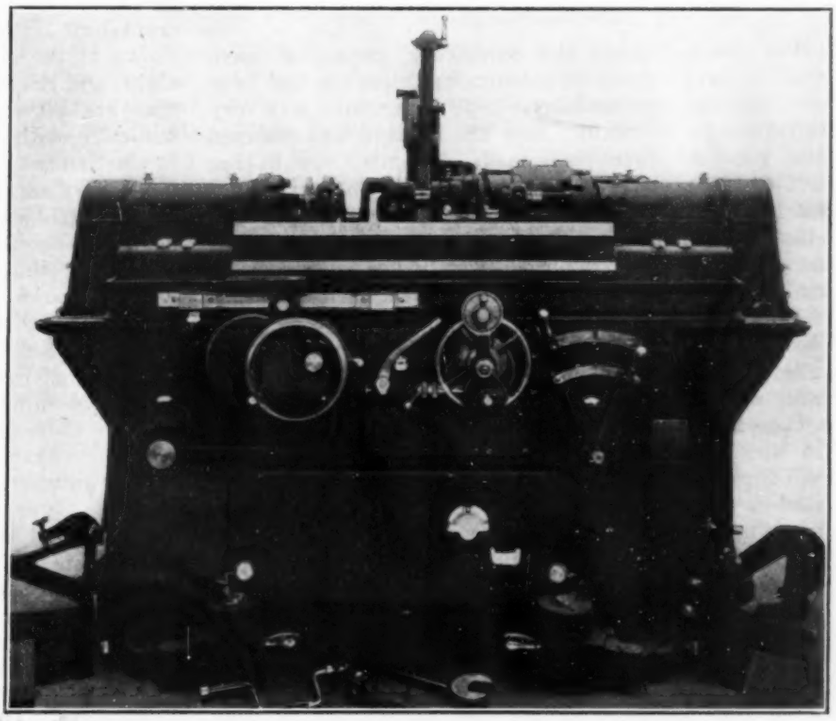


FIG. 7—SELF-CONTAINED CRANKSHAFT GRINDING MACHINE

into its place. The pistons are then ground at the rate of 75 to 90 pistons per hour, depending upon the degree of accuracy and finish required.

The attachment illustrated in Fig. 4 was developed for attachment to regular machines for grinding seats on valves. Adjustments for the length of the stem as well as the degree of taper on the seat are provided. A special feature of the attachment is the provision that has been made for grinding on centers, although other attachments of this same form are fitted with collets to grip the valve-stems.

Many of the makers of crankshafts have insisted upon very accurate round fillets at the ends of crankpins and bearings. A device for forming a radius on the grinding wheel and also for truing the face of the same wheel is shown in Fig. 5.

Certain jobs having a taper and several straight diameters can be ground best with the wide-face wheel. The forming device illustrated in Fig. 6 has been developed to form the wheel for grinding an entire surface, including tapers or straight portions. The form of the wheel face is generated from a form-bar that is located directly in back of the roller. The operator places the attachment on the table in front of the wheel which is brought into contact with the diamond. He then turns the handwheel, moving the diamond across the face of the wheel, following the outline of the form-bar and reproducing it on the wheel face. Since the introduction of this device the production has been increased from 100 to 400 per cent in a great many instances.

In ball- and roller-bearing work special arbors have been made for holding as many rings as can be covered by the wide-face wheel, not over 10 in. wide. By this method production has been increased from 100 to 400 per cent over what was formerly attained with narrow wheels. In addition to this the wheel-spindle reciprocating device has been applied to the machine. This addition improves the quality of the work, increases the production and reduces the wheel cost.

Special Machines

For several years the automobile companies have made a careful study of machine maintenance and have said that the overhead-drive type of machine was very expensive to maintain. Now the demand has changed and requests have been made for machines having self-contained drives and controls. The grinding-machine industry has brought out new types of machines with this thought in mind and also with the purpose of still greater production of good work at less maintenance cost. The very newest self-contained development is arranged for power table-traverse drive for such work as oil-tubes or rocker-arm shafts having a larger ground diameter than could be covered by a wide wheel.

Another special-purpose machine has been developed in which the grinding is done on the extreme right end for such work as axles, drive-shafts, pinion shafts, sleeves and other parts where the wide wheel is the most productive. For all short work a short, stiff, compact machine equipped with the wheel-spindle reciprocating attachment and the power in-feed attachment that is used for automatic straight-in feed of the wide-face wheel that covers the entire surface of the part being ground has been brought out.

All of these new-type heavier machines are equipped with new mechanisms for driving the wheel. The wheel spindle is driven by a belt from the power shaft, inclosed in the base, and running in self-oiling ball-bearings. The wheel-spindle bearings are of a new and improved type and are lubricated by a constant stream of oil, forced through the bearings by a pump. Their adjustment is so simple that the operator can overcome all looseness by simply turning the thumb-screws while the spindle is running.

I have mentioned these features because it is through these new and improved designs on the part of the grinding-machine builders that larger production and improved quality have been brought about.

Crankshaft Grinding Machines

Ever since the very beginning of automobile-engine building, the crankshaft has been a most difficult part to machine. The last operation has been the grinding of the crankpins, and the great difficulty has been to finish these pins round and straight to within small limits of accuracy, practically free from any imperfection. Considerable difficulty has been experienced in obtaining the required accuracy, and it is remarkable how successful the makers of crankshafts have been with the machines given to them for their use. Every grinding-machine builder has done his best to make machines that would produce crankshafts satisfactory to the trade, but more or less trouble in obtaining a satisfactory product has always been experienced. In the last two years still newer types of machine for grinding crankpins have been developed and installed in a number of automobile factories. These employ a new method of driving the work-spindles.

The machine illustrated in Fig. 7 has met the demands of the automotive industry for a complete self-contained unit. The ground product has been greatly improved and the production increased over that from older types of crankpin-grinding machines.

Automatic wheel in-feed mechanisms for semi-automatic crankpin grinding have been introduced in this as well as in other new and heavier machines. As a result, in some places the operator merely clamps a crankshaft into the work-holders, pushes the lever shown at the right of the wheel-feed gear over to the right, and releases the automatic steadyrest-lever. The pins are either rough-ground or finish-ground automatically with from a 15- to 25-per-cent increase in production over previous methods, with less wheel cost and a very satisfactory finished product.

The machine shown in Fig. 7 can be said to meet the demand for smoother running machines for this class of work and the traditional belief that gears produce chatter marks has been considered. The gears have been replaced with a silent-chain running from the lower drive-shaft to the table drive-shaft and other chains from both ends of the table drive-shaft to each revolving spindle. Where these machines have been adopted there have been no complaints of chatter-marks in the crankshaft.

The automotive industry has become so huge that it must be regarded as the chief element of machine-tool business and the principal factor in forcing new developments in machine-tool design and construction. Competition among builders of internal-combustion engines constantly calls for greater production and machines of greater precision. The desire of those most interested in furthering developments along the grinding line is to originate, instead of to copy some of the present achievements. To copy is not progressive; to originate is to progress.

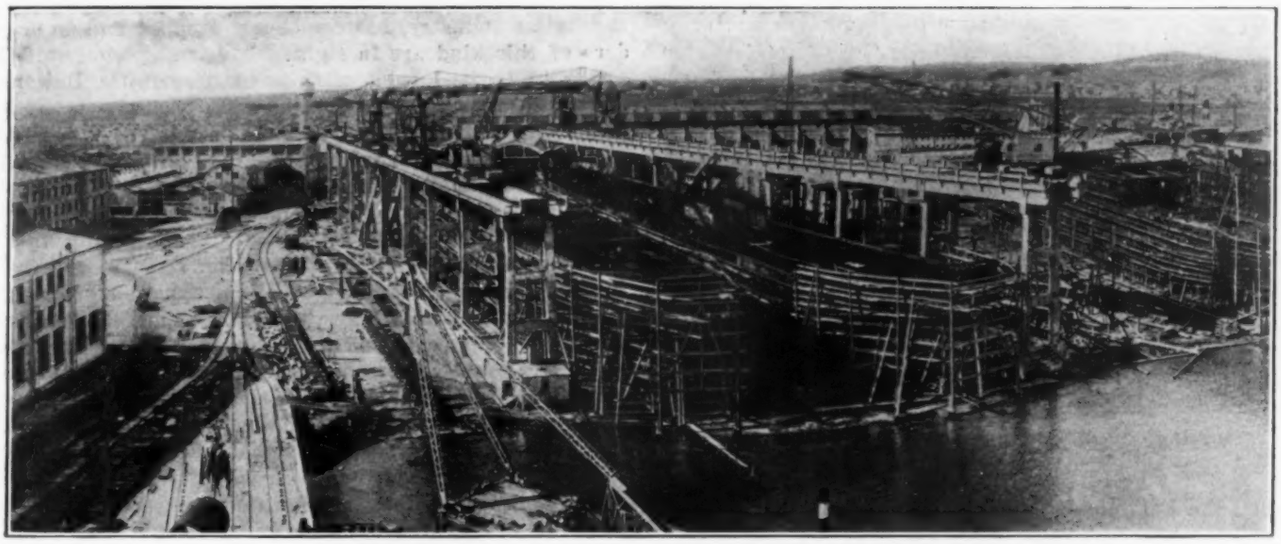


FIG. 1—A BIRD'S EYE VIEW OF PART OF THE RECONSTRUCTED SHIPBUILDING PLANT OF THE CANTIERE-NAVALE-TRIESTINO COMPANY

What Peace Has Meant for the Italian Shipbuilding Industry

BY HENRY OBERMEYER AND ARTHUR L. GREENE

The condition of the industry since the signing of peace — Tiding over inactivity with side production — Inauguration of industrial management in the industry

AN INCREASE of one million tons in Italian ship tonnage since the world war, a decrease of about 80 per cent in cargo rates, greatly increased world competition in the carrying trade, increased costs of ship construction conservatively estimated at five times pre-war costs, under which head come mainly increased costs of raw materials and necessary wage increases for workers in the shipbuilding trades, are the leading items listed by the managing director of the Cantiere-Navale-Triestino of Trieste, Italy, in summing up the marine situation of that country today. To claim that this industry, after four years of peace, presents any glowing picture of a return to normalcy and of peace-time productivity would be quite far from the truth. In view of the above, therefore, the query that follows is perhaps a natural one: What are the causes of present conditions and what will be the ultimate outcome?

To understand the situation existing at the present time in the shipbuilding industry of one of the principal maritime nations of the world, one must necessarily glance backward over the preceding four years and view the industry as it presented itself immediately after the signing of peace. At the beginning of hostilities between Italy and the Central Powers in May, 1915, the former nation had a total tonnage in merchant ships of 1,500,000. During the intensive submarine campaign waged by Germany and Austria in the Mediterranean and Adriatic Seas this tonnage was reduced, despite over-time production of the many Italian shipyards, to less than one-half. It might be said, therefore, that Italy emerged from the war with the cream of her shipping fleet destroyed. Under the terms of the Treaty of Versailles, Italy received from the enemy states, but chiefly from Austria, about 800,000 tons of shipping and with this as a nucleus, proceeded to reestablish her merchant marine on a bigger and even more pretentious scale than before the war. Encouraged by the then prevailing high cargo rates, she succeeded in increasing her tonnage within two years to 2,500,000 tons, partly through new construction and partly through purchase of United States Shipping Board vessels. What followed in 1920 is perhaps still too vivid in the memories of our own shipping interests to need repetition here. Sufficient to say that Italy, as well as the rest of the maritime powers of the world, found itself with an over supply of bottoms, international trade and commerce received a severe set-back and universal stagnation settled over the industry.

This situation has not been bettered with succeeding years. If anything the impasse hovering over the entire shipping industry of Italy is steadily growing more acute. The two largest shipyards of the country, the Cantiere-Navale-Triestino, which is shown in Fig. 1,

FIG. 2—ELECTRIC MOTOR AND TRANSFORMER DEPARTMENT

and the Establimento-Technico of Trieste, the latter of which was the largest naval construction and marine engine plant of Austria before the war, are working at less than 40 per cent of peace-time production.

To what extent the hopes of the shipbuilding industry have been fulfilled with respect to a continuation of the shipping boom of the war years and those immediately following, is shown by figures supplied the writers on the number of new ships constructed at these yards during the past three years. During this time only eleven new ships of comparatively small tonnage have been laid down, the majority of this number, however, having been started in 1918 and the early months of 1919. Only one of this number was started in 1920. During the past two years no new ships have been laid down. Six of the eleven ships started in 1918 and 1919 were of 8,500 gross tons, while the remaining five were of considerably smaller tonnage. At the plant of the Establimento-Technico, the lull in the shipbuilding industry has been, if anything, even more accentuated. This plant, which has specialized in the fighting type of ship as differentiated from the cargo and passenger boat, has been without any orders for new construction during the past three years. One of the many reasons, among others, given by officials of this company for the present lull in the naval program, has been because of the Washington Disarmament Conference Treaty which Italy recently ratified. Shipbuilding for foreign countries, which has always been one of the mainstays of

FIG. 3—100-TON ELECTRIC CRANE FOR SHIPPING PURPOSES

the Italian industry, has completely stopped and no orders of this kind are in sight.

But while the surplus of ships existing in the Italian mercantile marine since 1920 goes a long way toward explaining why its shipyards have been without orders for new construction from Italian shipping companies, it does not explain entirely why foreign orders have fallen away. In reply to this question asked a director of the Cantiere-Navale-Triestino Co., as to why this had occurred, he referred to his earlier remark concerning the great increase in cost of construction in Italy, mainly due as stated before to increased prices for raw material. Advanced prices for iron and steel, it was said, have greatly increased competitive difficulties with other nations, particularly with such countries as maintain their own ore fields. Together with this factor, as was pointed out previously, is that of wages of workmen in Italian shipyards, which while still below many other European countries, have risen very considerably over pre-war figures—in some cases estimated at three times the schedule for 1914.

At the same time rates for freight transportation have fallen as much as 30 to 40 per cent since the war. Intensified competition by nationals left with huge ship tonnage after the war is given as the main reason for present low carrying rates and while such surpluses exist, the outlook for the shipping companies themselves looks exceedingly dreary. Loss of emigration to the United States has been another severe blow to Italian shipping interests. As an instance of what has happened to many of the larger companies of the country, it is worth noting that the Cosulich Line, which before the war operated 40 ships in coastwise and trans-Atlantic service, today has only 25 ships operating at part time.

Tiding Over Inactivity

In view of this widespread slump in the shipping industry, it is perhaps surprising that the plants have not been forced to completely suspend operations. As has been the case with industries of other countries, the shipbuilding plants of Italy have had to resort to many varied lines of side production to tide them over the widespread inactivity of the past three years. The many phases of electrical development which have been noted in such countries as Germany, France, the Scandinavian countries and Switzerland, have received like impetus in Italy since the war and therein has lain the salvation of the industry. According to an official of the Cantiere-Navale-Triestino Co., the demand for electrical motors and electrical equipment of all kinds, both large and small, has been unprecedented in the history of the country and with the inauguration of the many electrical development projects, this particular field of industry has become the one great prosperous industry of the country.

The after-war condition of the State railroads, as well as the many repairs made necessary on rolling stock, has also been a factor in helping to keep other lines of production employed at full or part time during the past four years. Much of the repair of State locomotives and State railroad equipment was formerly done in Austria. Much in line with the same policy that the French have pursued, of French reconstruction for French labor, the Italian Government has attempted to make itself independent of the help of its former enemy and in pursuance of this policy, it has made special inducements to other lines of industry to take over such repair and construction work.

In the neighborhood of Trieste particularly, the Italian government has been anxious to keep the repair work of its newly acquired railroad systems and rolling stock out of the hands of the Austrians. With the idea in mind of helping to solidify the union of this old Austrian section to Italy, the Government has distributed railroad reconstruction work to the industries in this section and in the case of the Cantiere-Navale-Triestino Co., such action has been of material help in the present crisis in the shipbuilding trades. But by far the greatest boon to the industry has been the demand for electrical equipment. This company started the building of stationary electric motors and transformers as illustrated in Fig. 2, about six months past, and some idea can be had of the strides made in production when it is mentioned that the business done during that time has amounted to more than three million lire.

Much the same line of side production has been followed in the Establimento-Technico shipyards. In the St. Andree plant of this company practically the total number of employees are engaged in the manufacture of stationary engines and small Diesel engines of 100 to 800 hp. each, while but a few turbines and marine engines of four cycles are manufactured. As in the case of the Cantiere-Navale-Triestino Co., this marine engine plant has only been engaged in its new line of production for the past six months.

With respect to the aid given the unemployed by the State, the situation is perhaps one of the most deplorable to be found in any of the countries on the continent of Europe. There is found no such system as is prevalent in such countries as Germany, France and even Czecho-Slovakia, where both the Government and the industrials join forces in giving financial aid to the unemployed. The Government assists the unemployed worker to the extent of giving him 5 lire per day, but with the payment of this sum all other Government aid ceases. In such sections of the country, as in the neighborhood of Trieste, where much of the fighting between the Italians and Austrians took place, many of the unemployed eke out a meager existence by collecting bits of scrap iron and other metals not already salvaged and selling it to industrials for which they are payed about 100 lire per ton.

While peace may be said to have placed the Italian shipping industry in the lowest depths of a national industrial depression, it has had one inestimable advantage in making for better working conditions of the shipyard employees and of inaugurating a new system of industrial management in the industry. What has taken place in but one or two of the principal shipyards up to the present, is forecasted to extend not only throughout other industries of the same kind, but to extend as well to all the other major industries of the country. The Cantiere-Navale-Triestino Co. has been the first of several to introduce a system which before the war was totally unknown in practice among the industrial institutions of Italy. We refer to the American system of establishing welfare work for the bettering of the physical and moral surroundings of the worker and his family. The introduction of these humanitarian aids by the Cantiere-Navale-Triestino Co. has been certainly the most extensive and most admirable yet adopted in any of the industries of the country and seems likely to bring about radical changes in Italian labor conditions within the next few years. For this reason alone some of the methods introduced are worth noting more in detail.

The actual reconstruction of this plant in 1918 with new equipment such as the electric crane illustrated in Fig. 3 and new foundries similar to the one shown in part in Fig. 4, was accompanied by the erection of workingmen's homes, a worker's and employer's hotel for unmarried men, a theater, a trade and elementary school, a company restaurant, the establishment of a water supply station and central power plant for the furnishing of running water and lighting for the homes and hotels, a swimming pool and bathing beach, the erection of a central post office and finally and not least important, was the segregation of a large tract of land for a company farm.

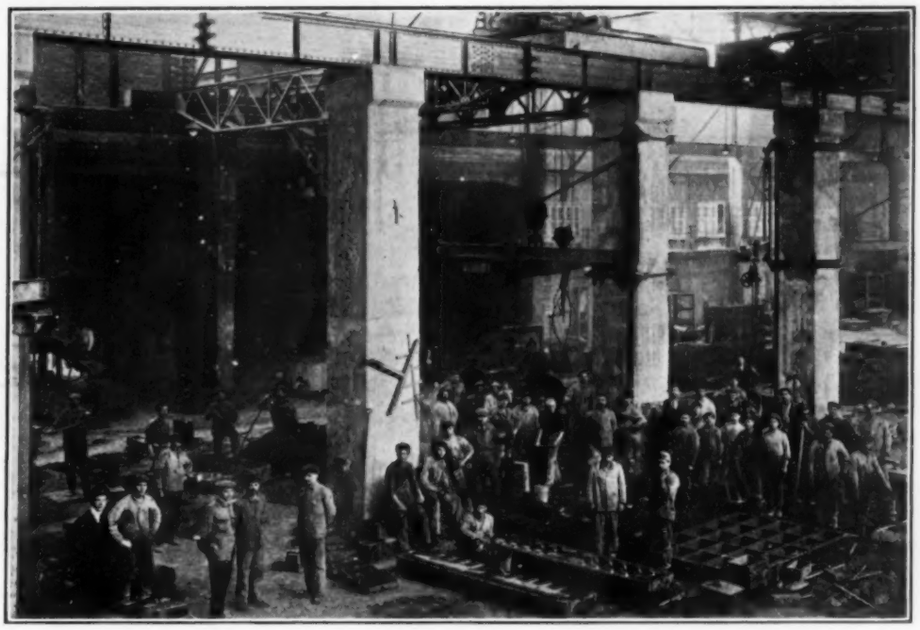


FIG. 4—ONE OF THE NEW WELL EQUIPPED FOUNDRIES

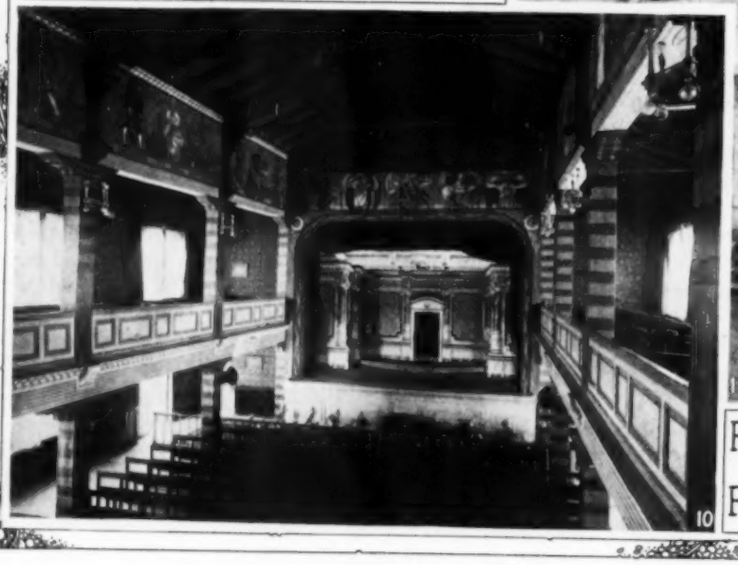
Most important, perhaps, was the establishment of workingmen's homes. Situated just outside the main buildings of the plant, the newly constructed homes shown in Fig. 5 are layed out on parallel streets and are generally two-and-a-half stories in height and made of concrete or stucco. Each house is supplied with electricity and running water from the company plant. Rental for one of these houses costs the worker a total of 70 lire per month (about $3.50 at the present rates of exchange) while a charge of five lire per month is made for electricity. Water is supplied free of charge. At the present time there are some 200 of these houses already constructed and occupied, while plans are being made for an extension of this number as soon as conditions warrant an increase in the number of employees and workers. For the unmarried worker the

Fig. 6 - Workingmen's dining room during lunch hour

Fig. 7 - Main worker's dining room

Fig. 8 - Entrance hall of staff hotel

Fig. 9 - Recreation room and bar at staff hotel



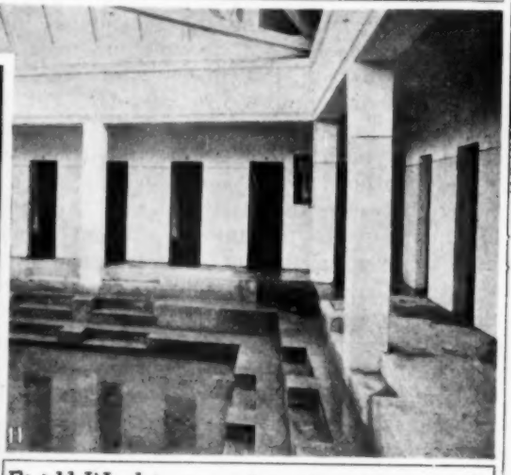


Fig. 11 - Workingmen's swimming pool

Fig. 10 - Company theatre for employees

company maintains a large hotel, interior views of which are seen in Figs. 6 and 7, with a capacity of 700 persons, where the worker may live by paying the same rental as the married employee or worker is charged for one of the homes. A special hotel, illustrated in part in Figs. 8 and 9, having a capacity of about 150 is maintained for the exclusive use of the administrative force and clerical staff.

A restaurant is maintained in each of the hotels for use of the workers and employees of the company. The charge for meals in these restaurants is virtually at cost, the worker paying six lire a day for breakfast, lunch and dinner and the staff employee paying slightly more, about 9 lire per day. No attempt at profit is made either on the rentals or on the food.

For recreational purposes the officials of the Cantiere-Navale-Triestino Co. have constructed a large theater, the interior of which is seen in Fig. 10, costing 500,000 lire, and capable of seating 1,000 persons in which is given a "movie" show every night during the summer months and at which the entrance is free of charge. In the winter the company engages operatic stars and musical talent from the principal theaters of Italy to give plays and concerts at stated intervals, to attend which the worker pays but a nominal entrance fee. A theatrical organization and orchestra is maintained by the workers and several times each season a play or concert is given by the local organizations. In other lines of recreation the company maintains an indoor swimming pool, a view of which is shown in Fig. 11, open to all workers and their families, while in the summer months the adjoining beach is used for water sports where bath houses have been built at the company's expense.

One of the new innovations in Italian industrial life is the trade and elementary school maintained on the company's premises. Both of these schools were built by the company when the plant was reconstructed and both were originally maintained and operated under its jurisdiction. Recently, however, the Government has taken over the elementary school but the company still operates and finances the trade school. All children of the company village are obliged to attend the elementary school up to a certain age and afterward they may attend the trade school free of charge until they have reached the age of fifteen years. Upon reaching this age they may enter the employ of the company. Instruction in the shipbuilding trade and allied lines is given the workers in the evening.

FIG. 5—MODEL VILLAGE BUILT FOR THE WORKMEN

While this brief résumé of fundamental conditions as found in the shipbuilding and mercantile industry of Italy today helps but little in solving the difficulties confronting the industry, it does present a view of conditions that throw some light on what the future holds in store. Most important is the view held by leaders in the industry, much the same as in our own country, that many of the existing yards in the country will have to be diverted to other lines of production. Much of the wholesale desertion of the industry now taking place will be definitely lost and never will return. To what extent this loss will be detrimental in establishing a larger Italian mercantile marine when world trade conditions return to normalcy, only the future can tell. Italy came out of the World War with a huge national debt, a debt owing our country alone of almost two billion dollars. Such is the financial and economic condition of the country that it cannot even hope to begin interest payments on this debt for some years to come, while many maintain that it will never be in a position to pay off the capital.

How these financial difficulties have reacted on the shipping industry is evident when it is stated that the Government, because of them, has been unable to grant that which is most needed to keep the industry on a productive basis—namely a state subsidy.

For the Italian shipbuilding and mercantile industry, however, the lessons taught in the last several years, have brought out some serious consequences. Practically dependent on outside sources for all raw materials which go into the building of the modern liner and cargo boat, she has seen prices for iron and steel advance to undreamt of levels, prices which an official of the Establimento-Technico estimated at seven or eight times that of pre-war prices.

That the Government can do anything to relieve the situation is beyond the hope of those in the industry. What the shipbuilders themselves will do under the circumstances is steadily becoming more apparent. The trend is being shown in what has already taken place in two of the principal shipbuilding yards of the country, namely the dismantling of parts of the yards and the turning of their facilities over to more lucrative lines of work.

Book Reviews

Blueprint Reading. By Joseph Brahdy. Published by D. Van Nostrand Co., 8 Warren St., New York, N. Y. Clothboard binding, 108 pages, 11x8 in., 100 illustrations, price $2.50.

The aim of this elementary textbook on the subject of blueprint reading, as stated by the author in his preface, is to enable the student with elementary school training, and with little or no knowledge of mechanical drawing, to read commercial blueprints. The methods for making blueprints are first described and, although it is stated that the student does not have to learn mechanical drawing to read blueprints, several rules and suggestions for making drawings are given to familiarize the student with the principles underlying the work.

The elementary conception of a working drawing as the representation of an object is explained with diagrams and isometric views and several methods to help in the visualization of the object represented on the drawing are given. Particular stress is laid throughout the book upon this matter of gaining a clear mental picture of the object drawn. The dimensioning of drawings and the use of the scale is well covered together with the reading of blueprints which show more or less than three views.

A chapter on orthographic projection is followed by one on conventional practice, and finally the drawings for several machine parts and a complete standard grinder are considered in detail.

The book is well arranged and should serve the purpose for which it is intended. The reproductions of blueprints are colored blue, a procedure which adds to the attractiveness of the book as well as familiarizing the student with the actual appearance of shop prints. A number of questions which can be answered from the drawing are given after each, and are arranged to call the attention of the student to all the details.

The Welding Encyclopedia. Third Edition. Compiled and edited by L. B. Mackenzie and H. S. Card. Flexible leather grain covers, 6x9 in., 437 pages, gilt edges, about 600 illustrations. Published by the Welding Engineer Publishing Co., 608 South Dearborn St., Chicago, Ill. Price, $5.

In the main the volume is the same as the second-edition encyclopedia announced on page 172d, Vol. 58, of the *American Machinist*. The first 160 pages of the book make up the actual encyclopedia or dictionary, where words encountered in welding practice are defined and explained. After this section are a number of chapters devoted to the different types of welding and to its chief applications. The aim has been to make the treatment complete, to cover the whole field of welding and to adapt the book to the needs of students and instructors as well as of shop men and engineers.

The latter object is accomplished by the addition to this volume of a chapter on the training of operators for both oxy-acetylene and electric arc welding. Courses of instruction are outlined. Other additions have been made in the present edition to make the treatment more complete, particularly on the subject of welding tanks and pipe. In the back of the volume are useful charts and tables, followed by a catalog or advertising section of about 75 pages.

Fundamentals of Welding. By James W. Owens. 659 pages 6x9 in., 279 illustrations. Published by the Penton Publishing Co., Cleveland, Ohio. Price in red cloth boards, $10.

The author of this book is U. S. Navy Welding Aide, and has been in direct charge of the welding work and instruction at the Norfolk Navy Yard for several years. He has gathered from his own experience and from other sources, a large amount of information of value to those interested in gas-torch, arc, or thermit welding. While the book touches lightly on mechanical, or machine welding and cutting, the instructions for the manual use of the gas-torch and arc are very complete, and numerous illustrated examples and tables are given to aid the beginner, student and advanced welder.

There are 25 chapters, headed as follows: Classification and Nomenclature; Preparation and Finish; The Gas Weld; The Arc Weld; Technic of the Arc Weld; The Thermit Weld; Gas and Arc Cutting; Metallography of the Weld; Residual Stresses; Speed and Cost of Welding and Cutting; Choice of Methods; Design; Inspection and Tests; Production and Distribution of Oxygen, Hydrogen and Acetylene; Arc Welding Generators and Transformers; Welding and Cutting Machines; Welding Rods, Electrodes and Fluxes; Protectors and Safety Precautions; Organization, Shop and School Layouts; Training; A Practical Gas Welding and Cutting Course; A Practical Arc Welding Course; Standard Specifications; Practical Applications; Summary and Conclusions.

Tentative Standards of the A.S.T.M. 859 pages, 6x9 in. Published by the American Society for Testing Materials, 1315 Spruce St., Philadelphia, Pa. Price $7 in paper, $8 in cloth.

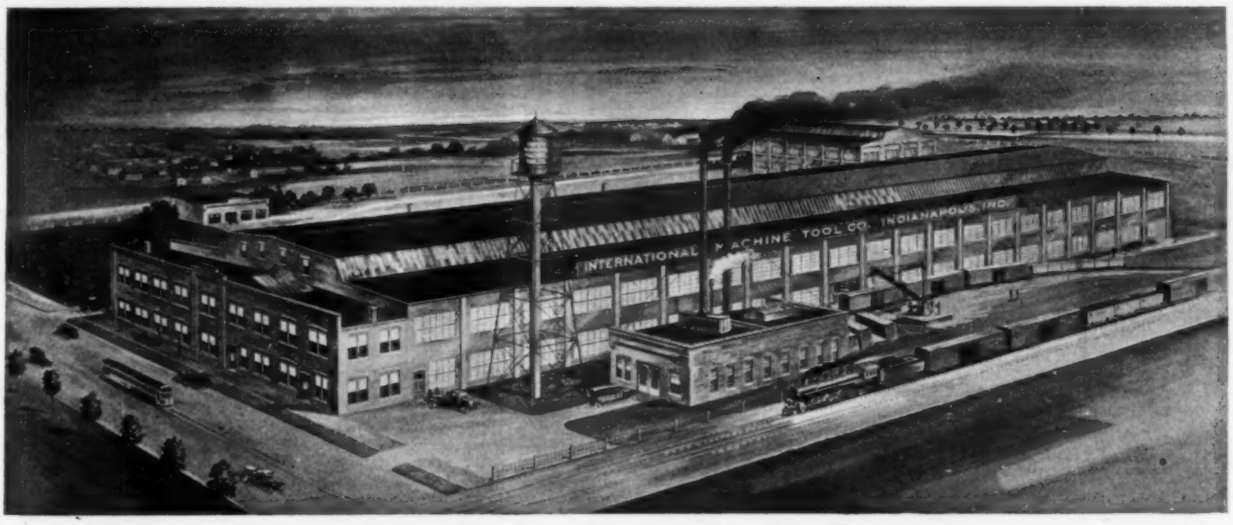
This volume is a very encouraging sign of the growth of standardization in this country. And though the standards given are called tentative, it is likely that most of them will be approved. The society calls a standard "tentative" until, after being published for one or more years to elicit criticism, it is finally adopted.

There are 170 tentative standards, varying from road material, which leads the list with 33 standards, to thermometers with but 3. Steel, wrought and cast iron have 23 standards while non-ferrous metals have 12, these being of most use to our readers. Three of the standards, for carbon tool steel, steel castings and heat-treatment of carbon-steel castings, are of particular interest to machine builders and users.

The book gives gratifying evidence that standardization is progressing. Users of the materials considered should study the standards proposed and either adopt them or point out to the A.S.T.M. where they should be changed.

1923 Year Book and Export Register of the Federation of British Industries. Industrial Publicity Service, Ltd., 4-7 Red Lion Court, Fleet St., London, E.C.4. Three hundred and ninety-two 7x9½ pages of articles and manufacturers and three hundred and two pages of advertisements. Bound in cloth boards.

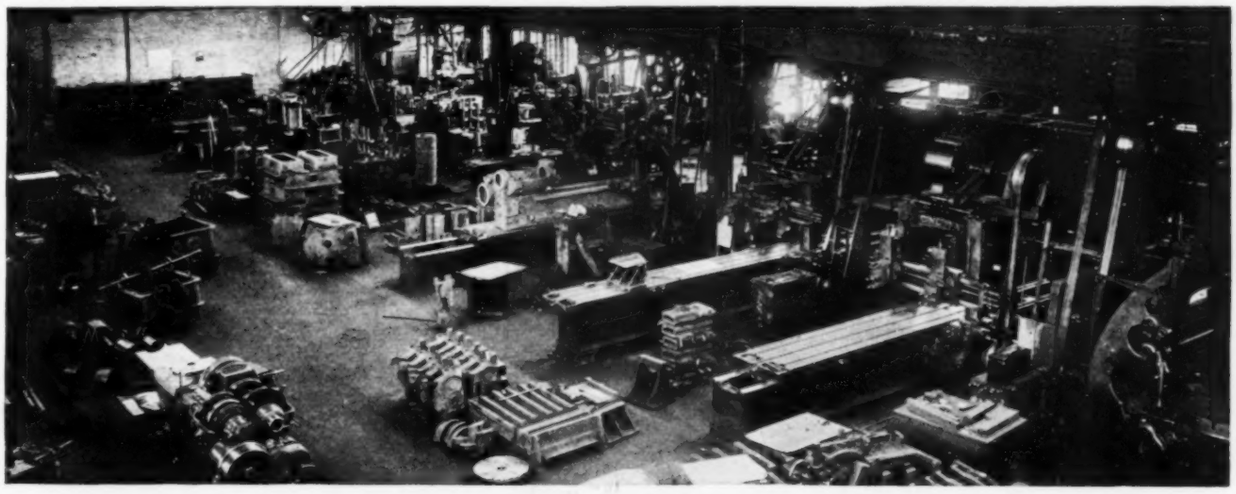
This book is well gotten up and while it is intended for such use as are the various commercial registers in the United States, its lists are apparently limited to the products of the Federation of British Industries, the members thereof and their advertisements.

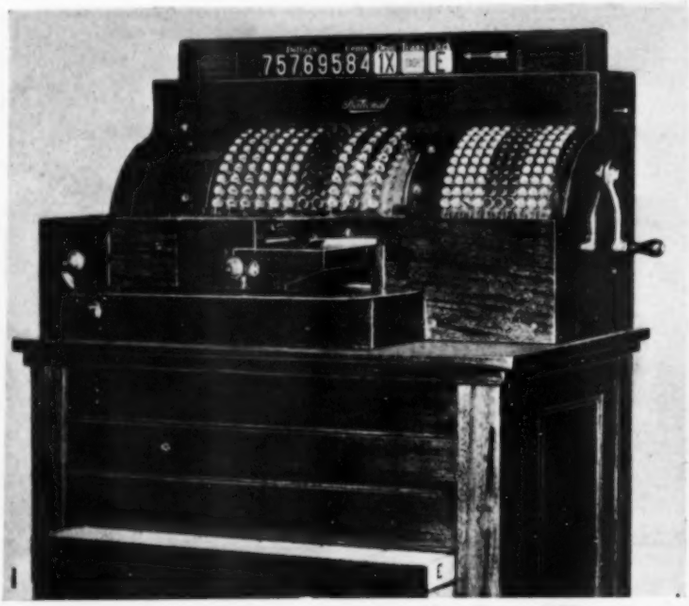


Where Machine Tools Are Made

The International Machine Tool Company

Founded 1906





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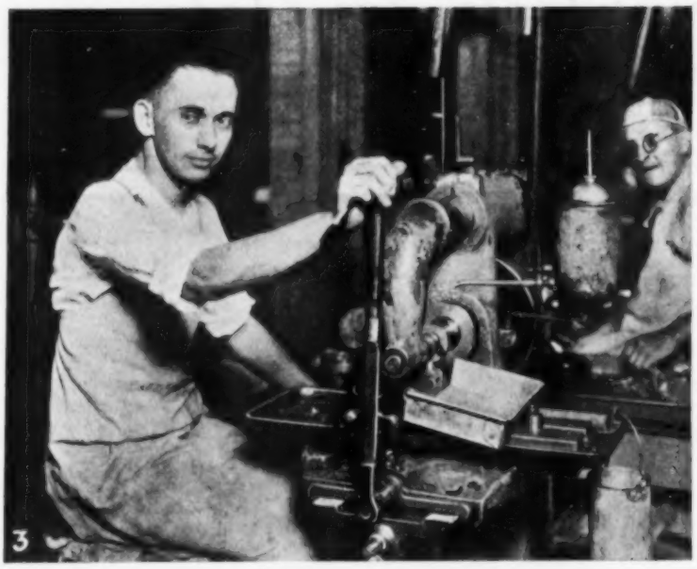

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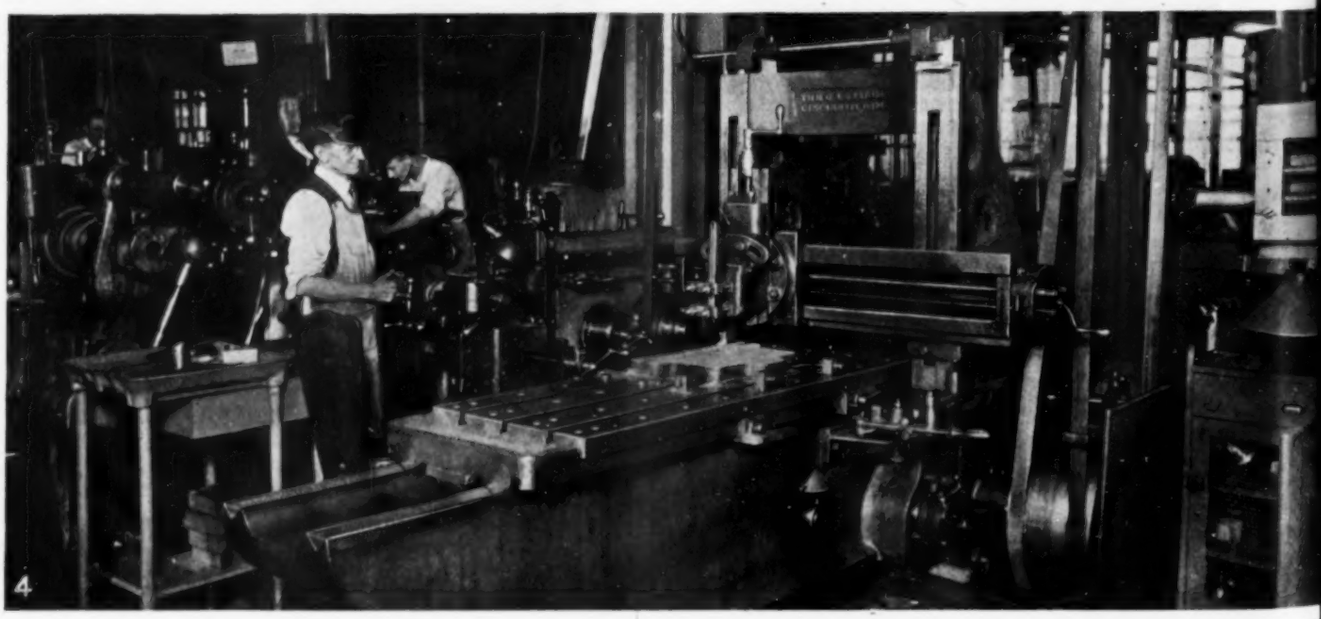
Machine Tools for the Cash Register

National Cash Register Co.
Dayton, Ohio



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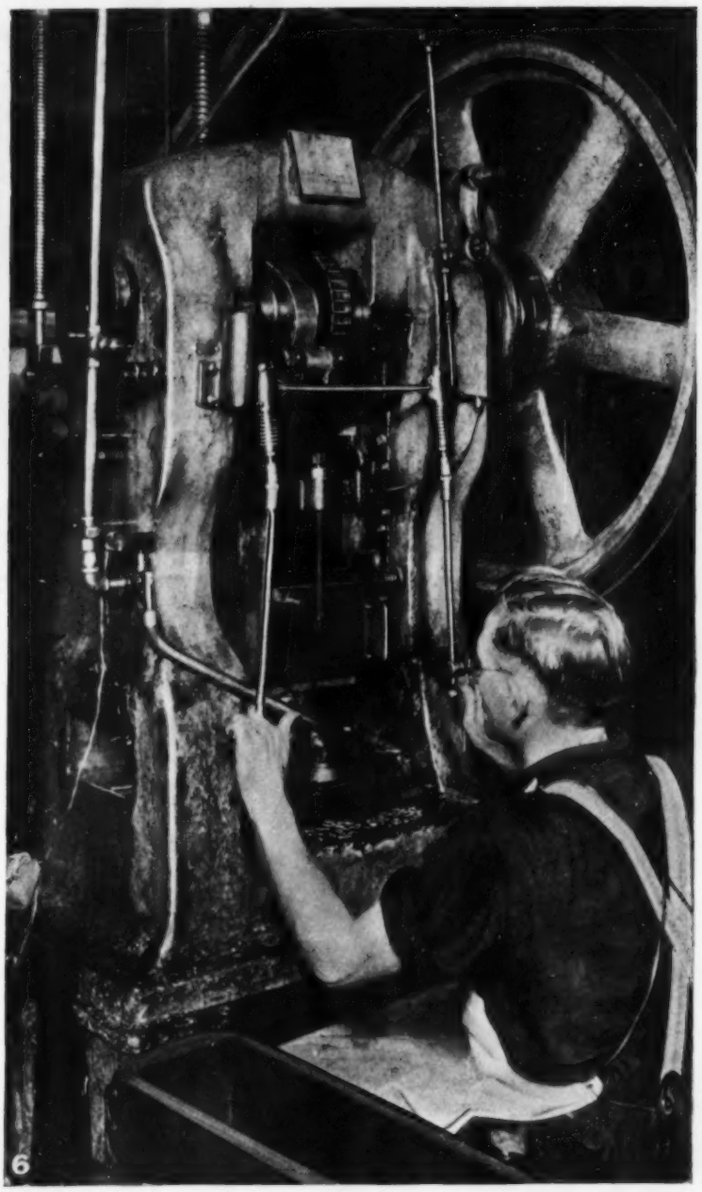


Fig. 1—The National Cash Register

Fig. 2—Multiple Drill on Sub-Assembly

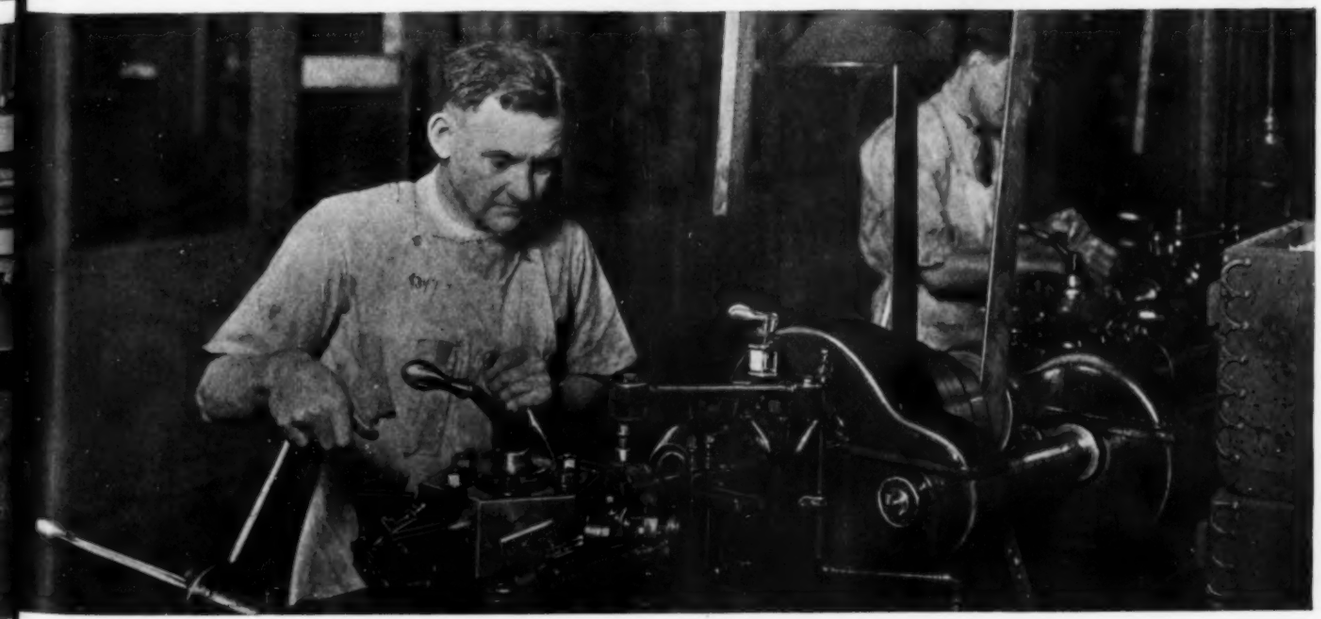
Fig. 3—Hand Milling Machine

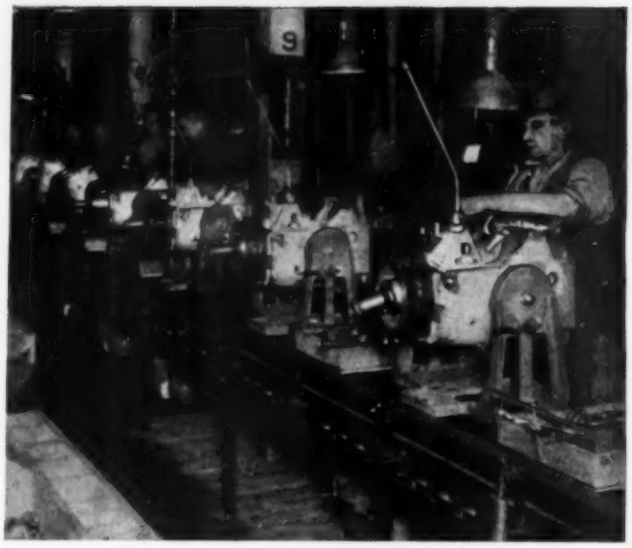
Fig. 4—General Machine Department

Fig. 5—Multiple Drill on Wooden Cabinet

Fig. 6—Jigger Punch Press

Fig. 7—Hand Screw Machine





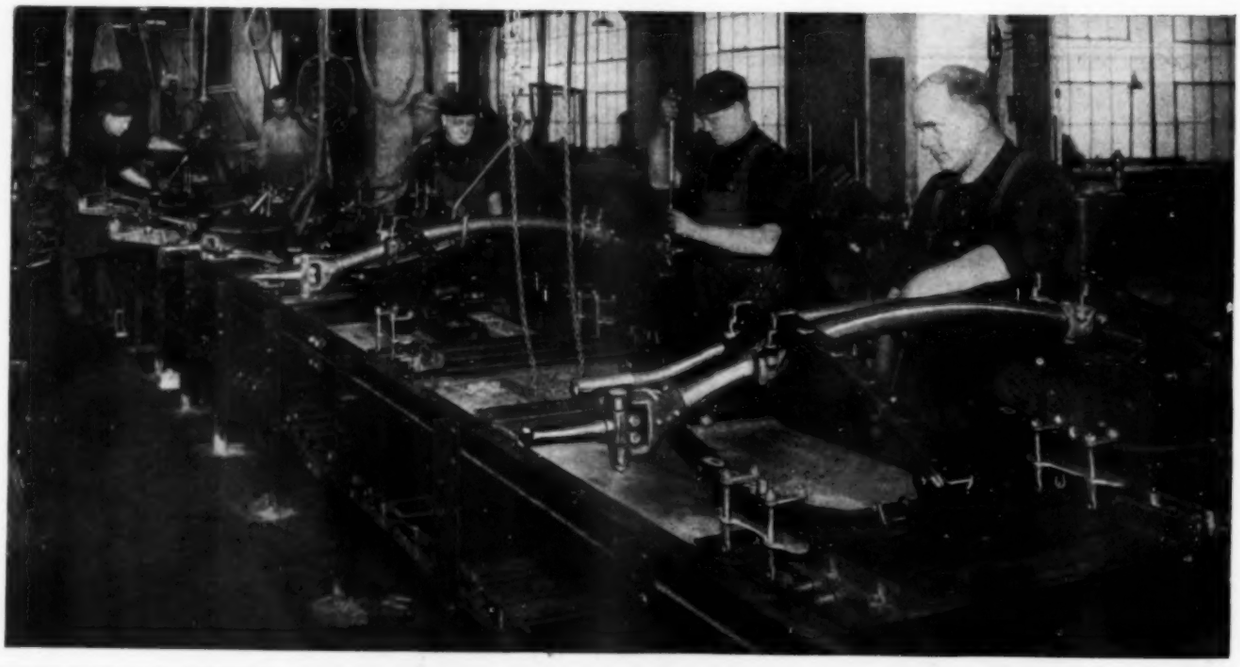
How the Franklin Rides to Completion

Above—Motor Assembly

Left—Transmission Assembly

Below—Front Axle Assembly

Photographs by courtesy of the Alvey-Ferguson Co.



Proposed Standard Nomenclature for Gearing

Terms proposed by the Sectional Committee* on Standardization of Gears—Have not been submitted as recommended practice — Now offered for study and criticism at large

THE nomenclature included in the following report of the Nomenclature Committee of the American Gear Manufacturers Association is published with the object of creating discussion and obtaining thereby helpful suggestions from everyone interested in gears. Communications may be sent to the secretary of the Association, T. W. Owen, 2443 Prospect Ave., Cleveland, Ohio, or to the editor of the *American Machinist*.

"Your committee, in co-operation with the various standards committees of our association, has been working right along on the simplification of the nomenclature of gearing. We already have submitted the report of the nomenclature as prepared by the bevel and spiral bevel gear committee, and as prepared by the spur gear committee. We will have to add the necessary classifications as required by helical gears, worm gears, racks, etc., as the work progresses.

"At the same time as this work has been progressing, the sectional committee of the American Engineering Standards Committee, has had this subject actively in hand, and acting under the sponsorship of the A.G.M.A. and the A.S.M.E., has thus worked hand in hand with your own committee. In the simplification and improving of the various gearing definitions, your committee herewith submits to the membership, the gearing definitions as accepted to date, by the sectional committee.

"These definitions have been determined upon as the result of considerable labor and consultation, and yet they are not submitted for recommended practice at this time, because it is thought best that the members have time for study and for criticism, because in actual use of these definitions, improvements may well be suggested."

*The Sectional Committee on the Standardization of Gears is under the sponsorship of the A.G.M.A. and the A.S.M.E. After the suggestions obtained by publicity have been considered, the accompanying nomenclature, evolved by the Sectional Committee, will be revised and offered to the sponsor bodies for approval.

When a dimensional value is given to any of the following terms, it is understood that they are taken from dimensions based on theoretical conditions and proportions.

Active face is the length of the working surface of the teeth in the axial plane.

Addendum is the distance, normal to the pitch surface, from the pitch surface to the top of the tooth.

Addendum angle is the angle between the pitch cone and the face cone in a plane containing the axis. (Also called the increment angle.)

Angular bevels are bevel gears which are to operate on shafts having an included angle other than 90 degrees.

Arc of action. The arc of action is the angular distance a tooth travels from the point where it first makes contact with its mating tooth until it leaves contact. (Sometimes called angle of action.)

Arc of approach is the angular distance from the point where tooth contact begins to the pitch point.

Arc of recess is the angular distance from the pitch point to the point where tooth contact ceases.

Back angle is the angle included between the plane of the pitch circle and a plane tangent to the large end of the tooth. (Sometimes called the edge angle.)

Back cone is the cone generated by swinging the back cone radius about the axis of the gear.

Back cone radius is the distance perpendicular to the pitch surface from the pitch line to the axis. (This distance is also called virtual pitch radius.)

Backing is the distance parallel to the axis from the crown to a shoulder or hub extension.

Backlash is play between teeth of mating gears.

Base circle is that circle from which a line is unwound to generate the involute curve.

Bottom land is the surface of the gear body between adjacent teeth.

Center distance is the shortest distance between the axes of mating gears.

Chordal addendum is the greatest perpendicular distance from the top of the tooth to the chord subtended by the circular thickness arc. (Sometimes referred to as corrected addendum.)

Chordal thickness is the length of chord subtended by the circular thickness arc.

Circular pitch is the distance on the circumference of the pitch circle between corresponding points of adjacent teeth.

Circular thickness is the thickness of a tooth along the pitch line.

Clearance is the shortest distance between the top of a tooth and the bottom of its mating space.

Cone center is the apex of the pitch cone.

Cone center to crown is the distance parallel to the axis from the cone center to the crown of the gear.

Cone distance is the shortest distance from cone center to any point on the pitch circle. (Sometimes called apex distance.)

Crown is the edge formed by the intersection of the face cone and the back cone.

Dedendum is the distance, normal to the pitch surface, from the pitch surface to the bottom of the tooth space.

Dedendum angle is the angle between the pitch cone and the root cone in a plane containing the axis. (Also called the angle of decrement.)

Diameter increment for bevel gears is the amount added to the pitch diameter to obtain the outside diameter.

Diametral pitch is the number of teeth divided by the pitch diameter in inches.

Face angle is the angle between a plane tangent to the top of a tooth and the axis.

Gear ratio is the number of teeth in gear divided by the number of teeth in pinion, or number of threads in worm.

Helical gear is one in which the teeth are formed along a helix. (Helical gears may run on parallel axes, in which case one gear has a right hand helix while its mating gear has a left hand helix. Helical gears may also run on axes which are not parallel. In these cases

the helices of both gears may be of the same hand. Such gears are commonly miscalled "Spiral Gears.")

Helix angle of a helical gear is the angle between the helix at the pitch line and the axis of the gear.

Herringbone gear is a gear composed of two helical sections, one right hand and the other left hand.

Interchangeable gear system is one which permits gears of any tooth numbers of the same pitch to run together.

Interference means contact between mating teeth at some other point than along the line of action.

Line of action is the line along which all contact between mating teeth occurs. (On correct involute gears this line of action is the common tangent to the base circles of mating gears. This line is also called the path of contact.)

Long and short addendum teeth have a longer addendum on the teeth of one member than on those of the mating gear.

Normal circular pitch is the distance on the pitch surface along a helix perpendicular to the helix angle of a helical gear from one tooth to the corresponding point of the adjacent tooth. (It is commonly miscalled the normal pitch.)

Normal diametral pitch is that which corresponds to the normal circular pitch.

Normal pitch. The involute normal pitch is the normal distance between two successive and corresponding involute tooth surfaces. (It is equal to the circular pitch multiplied by the cosine of the pressure angle.)

Normal pressure angle is the angle included between a line perpendicular to a normal tooth profile at a point on the pitch surface and a plane tangent to the pitch surface at that point.

Outside diameter is the diameter of the greatest circle which contains the tops of the teeth.

Pitch angle is the angle between a plane tangent to the pitch cone and its axis.

Pitch circle is the circle formed by the intersection of the pitch surface and a plane perpendicular to the axis.

Pitch diameter is the diameter of the pitch circle.

Pitch line element is a line, curved or straight, on the pitch surface, formed by the intersection of the tooth and pitch surfaces.

Pitch point is the point of tangency of the pitch lines of two mating gears.

Pressure angle is the angle between the line of action and a line tangent to the pitch surface at the pitch point.

Root angle is the angle between a plane tangent to the bottom of the tooth space and the axis.

Shaft angle is the included angle between the shafts upon which a pair of bevel gears operates.

Straight bevel gear is a bevel gear whose pitch line element is a straight line.

Throat increment for worm gears is the amount added to the throat diameter to obtain the outside diameter.

Tooth bearing is the area of the working surface of a tooth which has contact with its mating tooth.

Tooth bottom is a line in the bottom land joining the tooth flanks.

Tooth face is the surface between the pitch line and the top of the tooth.

Tooth fillet is the fillet at the bottom of the tooth flank joining the bottom of the tooth space.

Tooth flank is the surface between the pitch line and the bottom of the tooth space.

Tooth top is a line in the top land joining the tooth faces.

Top land is the surface of the tooth which is farthest from its supporting body.

Undercut refers to that condition where part of the conjugate surface of the flank has been cut away.

Whole depth is the greatest depth of tooth space perpendicular to the pitch surface.

Working depth is equal to the sum of the addenda of mating gears. (It is also equal to the whole depth minus the clearance.)

The New Screw Thread Standard—Discussion

BY J. E. WINTER
Winter Bros. Co., Wrentham, Mass.

After looking over the article by Mr. Flanders on "The New Screw Thread Standard" on page 167 of the *American Machinist*, it seems to the writer that one point under the subject of "symbols" requires straightening out.

My attention was called to the fact that there would still be quite a chance for confusion in regard to the lead and pitch of multiple-thread taps or screws if we use the capital "*P*" to represent the lead and the small "*p*" to represent the thread interval, unless the small "*p*" is made in the form used in writing rather than in the printed form as in the article in the *American Machinist*.

A great many specifications for taps come to us in the form of rough sketches. In cases of this kind it seems that there would be quite a chance that we would not know whether a customer was referring to lead or thread interval.

As it is now, we scarcely ever receive an order for multiple-thread taps without writing to the customer and asking that he specify both the lead and the pitch, so that there will be no chance for a mistake.

We find that most of the multiple-thread taps in use are marked to indicate the lead only. Thus a tap that is marked "6 double" we would understand to have a lead of $\frac{1}{3}$ in. Some of our customers would order such a tap by specifying "12 P double." In that case we would understand that they wanted a tap with $\frac{1}{6}$-in. lead, just the same as the one just referred to and marked "6 double."

It seems that standard practice in regard to marking should be developed so there would be less chance for misunderstanding than at the present. Nothing in the new standard as given in Mr. Flanders' article helps to straighten this matter out any. In fact, we think that it has increased the chances for a mistake, because before this the letter "*P*" has been used in connection with pitch diameter or pitch, but never with lead.

Casting Crown Brasses and Hub Plates in Place—Discussion

BY HENRY C. FRANCIS

From the letters published on pages 729 to 731, Vol. 59, of the *American Machinist*, under the title given above, it appears that on the average railroad, the lateral wear between wheels and driving boxes becomes too great before the crown brasses need attention. This would indicate that we have not paid enough attention to the question of hub liners and their wearing qualities.

Have we overlooked the fact that one of the greatest, if not *the* greatest, item of cost in locomotive repair, is the loss of earning power while the locomotive is idle?

On the D., T. & I., or, as it is now generally known, the "Ford" railway, hardened and ground vanadium-steel hub liners are used. The wear plates on the boxes are of hard bronze having excellent wearing qualities. It naturally costs more to apply these plates than where boiler plate or cast iron is used on the wheel hubs, and scrap brass or babbitt on the driving boxes. But the locomotives never have to be taken out of service because of lateral wear and the earnings during the period when they would otherwise be out of commission, pay the cost many times

Babbitting Crossheads to Finish Dimensions

By FRED H. COLVIN
Editor, *American Machinist*

Two efficient fixtures that have materially cut the cost of babbitting crossheads—The method described saves babbitt and releases a planer and operator for other work

ONE of the time-saving methods in use at the Scranton shops of the Delaware, Lackawanna & Western R.R. is that by which crossheads and crosshead shoes are handled in the babbitting process. The accompanying illustrations show both the method of doing the work and the details of the apparatus in which it is done.

Two types of crossheads are in use, one type being solid, as shown in Figs. 1 and 2, has the babbitt metal cast directly on the crosshead itself, eliminating the use of crosshead shoes. In Fig. 1 the operator has just removed the crosshead from the babbitt furnace, where it was immersed in the melted babbitt, for the double purpose of removing the old metal and for preheating it for retinning.

The operator is shown cleaning the crosshead with sal ammoniac, having previously swabbed the surface with muriatic acid so that the solder he is holding in his right hand will "take" and cover the surface with a uniform coating of solder, or "tin" as it is called in the language of the shop. This operation requires considerable care, as in order to have the babbitt adhere thoroughly, the whole surface must be carefully tinned before the crosshead is placed in the babbitting fixture, as shown in Fig. 2, for pouring the metal.

The babbitting fixture is also shown at the right of Fig. 1 with a crosshead in place and the molds adjusted ready for pouring the babbitt. Fig. 2 shows a closer view of the fixture with a crosshead in place and the babbitt being poured on one side.

The Lackawanna does not use an oil torch or a furnace of any kind for preheating crossheads or crosshead shoes for the babbitting operation. The crosshead and shoes are placed in molten babbitt so that the heat will remove any old metal which is still in place and at the same time they will be properly preheated for the babbitting operation which follows immediately. This method saves large quantities of babbitt and makes a very satisfactory job in every way.

Details of the fixture are shown in Figs. 3, 4 and 5, and will, perhaps, be more readily understood by referring to Figs. 1 and 2 from time to time. The crosshead

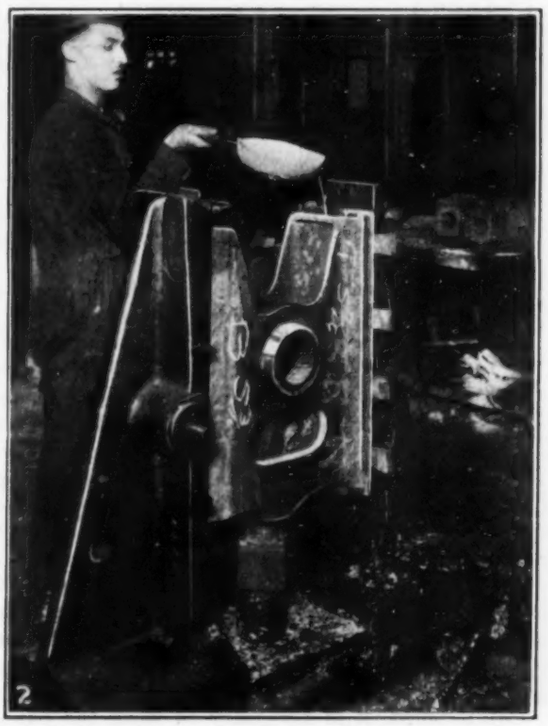


FIG. 1—PREPARING CROSSHEAD FOR BABBITTING. FIG. 2—BABBITTING CROSSHEAD IN SPECIAL FIXTURE

is located by the piston-rod hole on the plunger *A*, which is turned to the standard taper of ¾ in. per foot. The uprights *B* and *C* carry the adjustable molds for the babbitt and are moved by a right- and left-hand screw so as to maintain an equal distance from the center of the crosshead. The width of the guide bar, which the babbitt lining must fit, is specified by the round house or the erecting floor foreman. The wedges which form the mold, or in other words, which represent the guide bar, are then adjusted to the proper width.

The arrangement and operation of the wedges can be seen by referring to Figs. 3 and 4. The taper of the adjusting wedges is 0.0902 in. per in. on both sides, which gives 3¼ in. taper on each side or 6½ in. taper on both sides in the length of 36 in. The wedges have a 10 pitch rack cut for a distance of 12 in. on the back side, as shown in Fig. 4. This rack is not square with the surface of the wedge on which it is cut, as can be seen, but is cut at the angle of the wedge movement.

from the wedges which form the mold. In the original machine this was done by a rack and pinion below the locating bushing *A*, Fig. 3. This method, however, did not prove entirely satisfactory and the ball-bearing screw jack, shown in Fig. 3, was substituted with entire success.

The other type of crosshead referred to has the shoes separate from the center. The shoes are made standard so as to be readily supplied from a small stock which is kept on hand. When the engine house foreman calls for crosshead shoes, he furnishes the shop with the width of the guides only, the distance between the guides as well as the size of the bolt holes, being standard.

Then the machine shown in Fig. 5 is brought into play, the crosshead shoe placed in position and the wedges adjusted to the proper width as in the other fixture. The crosshead shoe has been previously immersed in molten babbitt so as to melt out the old metal and also to preheat it for the casting of the new lining.

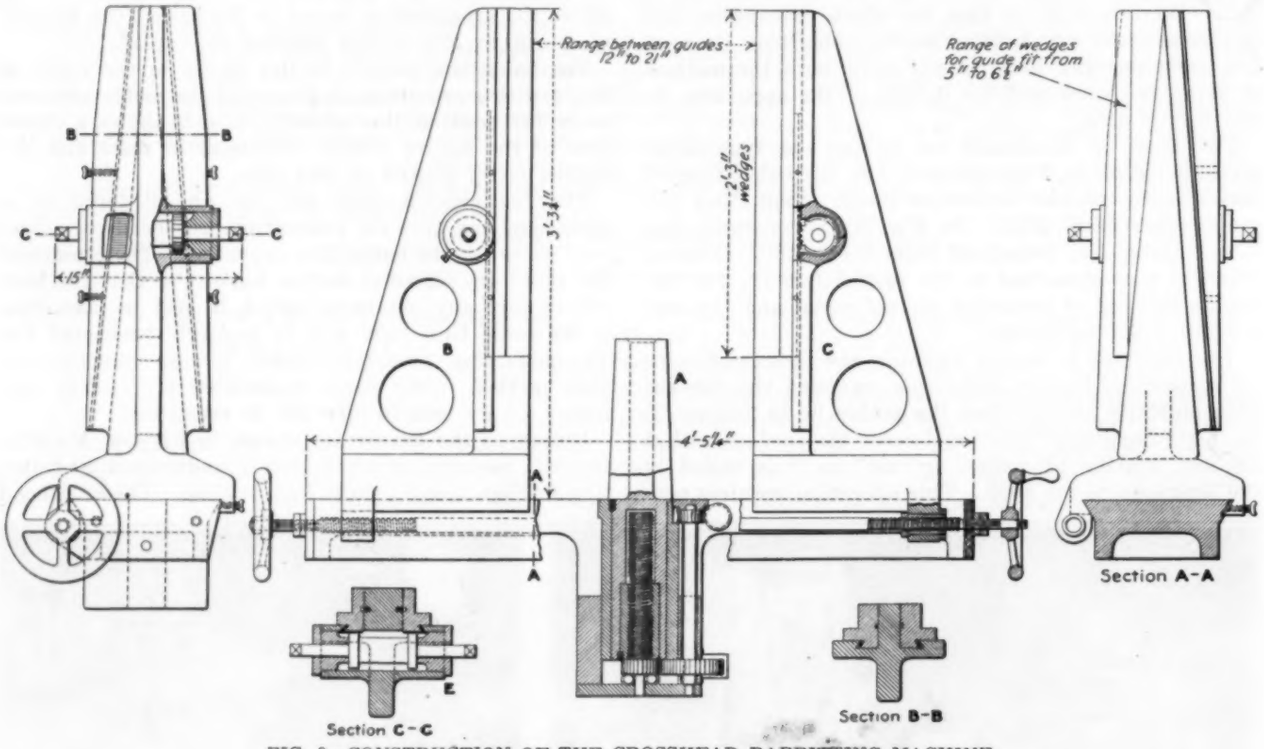


FIG. 3—CONSTRUCTION OF THE CROSSHEAD BABBITTING MACHINE

The operation of the wedges will be made clear by referring to *E*, Fig. 3, which shows how the narrow-faced pinions mesh into the rack on each wedge, so that by turning the square-ended shafts on which the gears are cut, both wedges are moved up or down and made wide or narrow as required. The wedge rack moves across the face of the gear as it goes up or down.

After the crosshead has been put in place in the fixture, the two uprights are moved together by the right- and left-hand screw, until the space between the wedges is the same as the distance between the guides on the locomotive. The wedges are then adjusted by means of the square-ended shaft, until they are set to the same width as that of the guides of the locomotive to which the crosshead belongs.

After the crosshead has been babbitted and the metal cooled, it is necessary to work the babbitt loose It is cleaned and tinned in the same way as the crosshead itself, which was shown in Fig. 1. Fig. 5 shows the metal being poured.

The shoe-babbitting fixture is shown in Fig. 6 and by comparing this illustration with Fig. 5, it will be easy to follow the operation. Similar parts are marked with the same letters in both figures so far as possible.

The crosshead shoe is laid in position between the four pins at *A* and *B*. Loose bushings of various diameters can be slipped over these pins to accommodate shoes of different sizes with a minimum of movement of the toggles which are moved by the screw *S*. Movement of the toggles centers the shoe between the four pins and enables the wedges, which represent the crosshead guide, to be centered with relation to the shoe. In this way the babbitt metal will have a uniform thickness on each side.

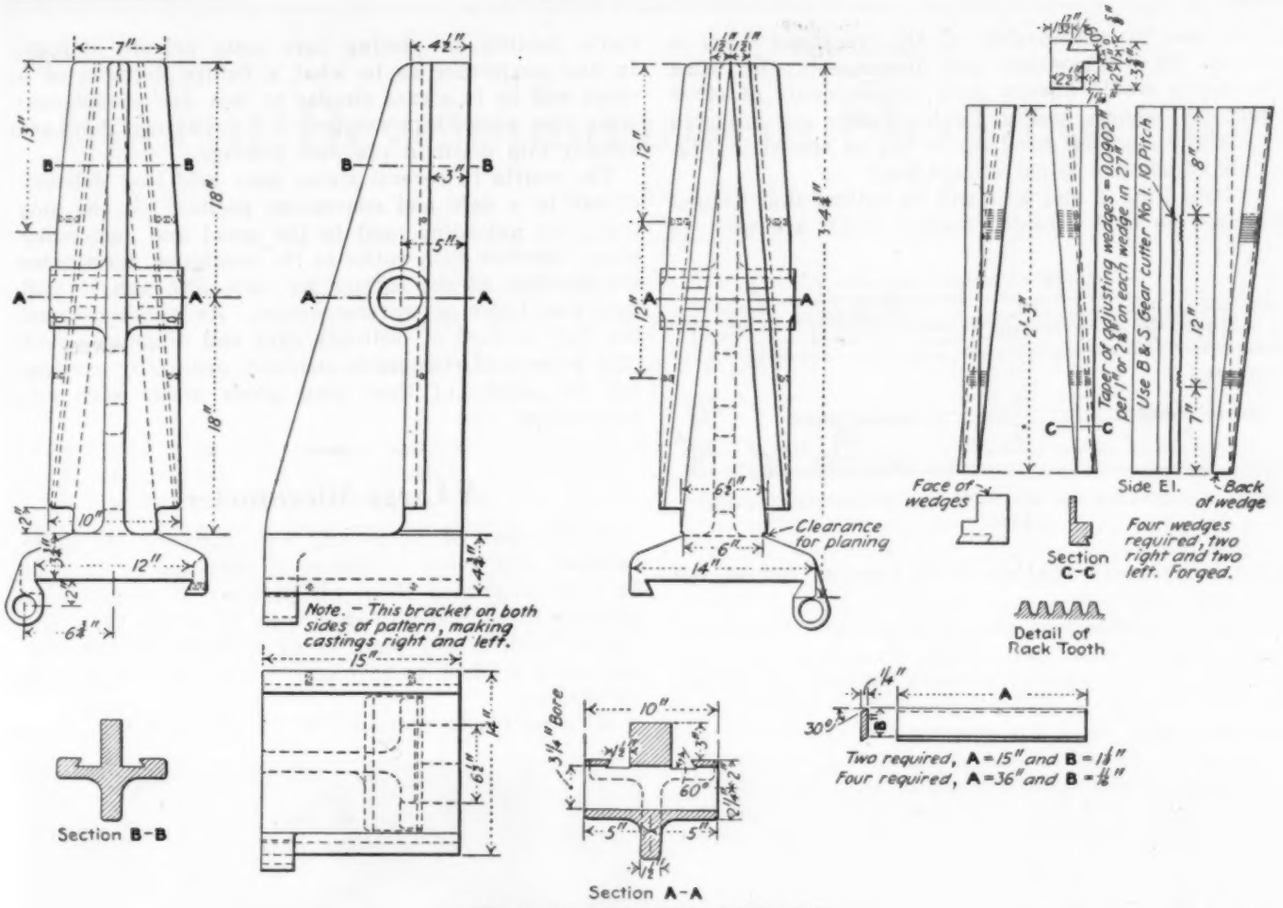

Note. – This bracket on both sides of pattern, making castings right and left.
Section B-B
Section A-A
Clearance for planing
Taper of adjusting wedges = 0.0902" per 1" or 2¼" on each wedge in 27"
Use B & S Gear cutter No. 1, 10 Pitch
Face of wedges
Back of wedge
Side El.
Section C-C
Four wedges required, two right and two left. Forged.
Detail of Rack Tooth
Two required, A = 15" and B = 1⅛"
Four required, A = 36" and B = ⅛"

FIG. 4—DETAILS OF THE WEDGES

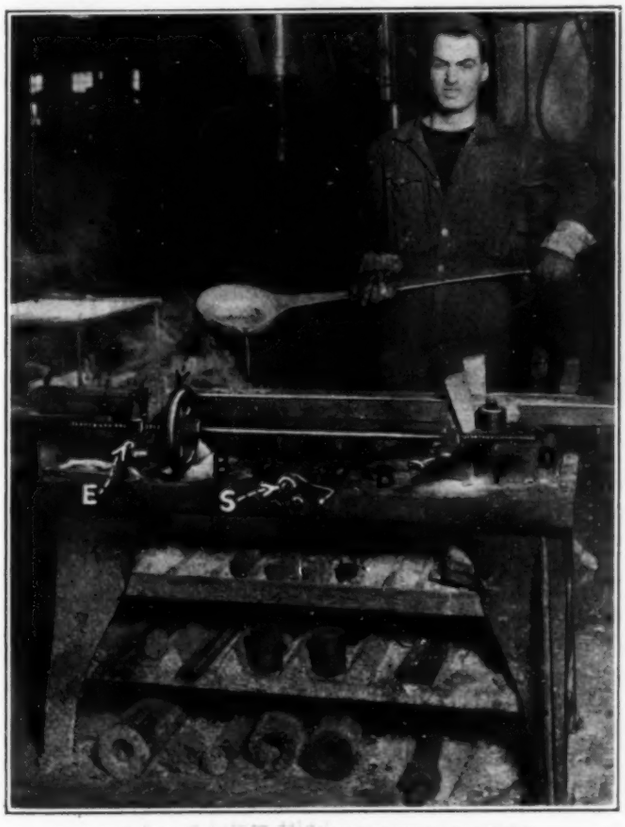


FIG. 5—BABBITTING CROSSHEAD SHOE

After the crosshead shoe is in place, the wedges are laid in position on supports *C* and *D*, and between the pins shown on the arms *E* and *F*. The supports *C* and *D* hold the wedges at the proper height to give the desired thickness of metal between the crosshead and the guide. The arms *E* and *F*, center the wedges with relation to the crosshead shoe in much the same

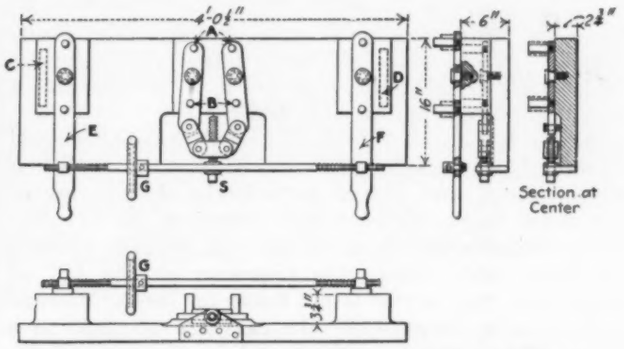


FIG. 6—DETAILS OF THE CROSSHEAD-SHOE BABBITTING FIXTURE

manner as the shoe itself is centered by the toggle in the middle. The handwheel *G* moves the levers *E* and *F* by means of a right- and left-hand screw and positions the wedges with reference to the crosshead shoe itself.

Details of the wedges are shown in Fig. 7 which also gives the principle dimensions. The wedges are dovetailed together, as shown at *A*, so as to present a smooth surface to the babbitt. Sufficient adjustment

is provided to accommodate all the crosshead shoes in use on the Lackawanna and presumably the same dimensions would answer most requirements of other roads. As shown in Fig. 7, the wedges are adjusted by a right- and left-hand screw but as shown in Fig. 5, this adjustment is not always used.

In both Figs. 2 and 5, it will be noticed that wedges are used to hold asbestos boards which are used to

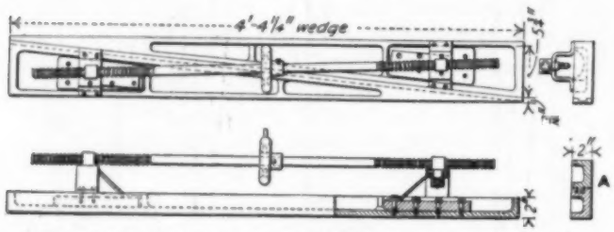


FIG. 7—DETAILS OF WEDGES FOR CROSSHEAD-SHOE FIXTURE

prevent the molten babbitt from running out at the ends and sides.

Economic features of this work are that the use of metal molds makes practically die-cast guides and bearings and that all machine work has been eliminated. The two fixtures shown have released one planer which was constantly used for planing the crossheads and shoes under the old system of babbitting and planing. This method also saves enormous quantities of babbitt. It is believed that crossheads and shoes babbitted in this way give better service than by the old method.

Who Is Liable for Loss After Car Is Placed on a Private Siding?

(Business Research Bureau, LaSalle Extension University)

During the night a car full of canned foods was placed on the private siding of a Chicago concern. Upon arriving at the plant the following morning, the head of the shipping department for this concern found the door of the car open and part of the contents missing. The concern filed a claim to recover the loss from the railroad. The carrier rejected the claim. The point at issue is: To what extent is the carrier liable for loss or damage of goods after the car is placed on private industrial tracks?

One of the clauses of the commonly called "old bill of lading" provided that property received or delivered on private sidings should be entirely at the risk of the owner until the cars were attached to, or after they were detached from, trains. In several cases it has been held, under this provision of the bill of lading, that the carrier is not liable for loss or damage to the goods except while the cars are attached to a train. This point was illustrated in the case of the Kingman St. Louis Implement Co. vs. the Southern Railway Co. It was held in this case that the carrier is not liable for loss of goods after delivery at the switch of the consignee. It was considered that the responsibility of the railway company ended as soon as the transportation of the goods was completed.

This clause of the old bill of lading has been changed so as to omit mention of private or other sidings, and refers only to stations, wharfs, or landings at which there is no regularly appointed agent. Since this modification has been made, we are unable to discover any decisions which bear upon the extent of the carrier's liability in placing cars upon private sidings. In any conjecture as to what a future decision of a court will be in a case similar to this, one should consider the general principles of liability as they are already laid down in previous findings.

The courts in several states have held that delivery of car in a safe and convenient position on the side track for unloading, and in the usual and customary place, together with notice to the consignee, terminates the liability of the carrier as such, although it still continues liable as warehouseman. As warehouseman, the duty is that of ordinary care and diligence—such care as men of reasonable prudence ordinarily exercise for the safety of their own goods under such circumstances.

A Large Micrometer

Micrometers of 1-, 2- and 3-in. capacity are quite common, and every toolmaker is supposed to have at least one concealed about his person. Micrometers to measure 6, and even 12 in. are by no means rare, and the tool-crib of any plant doing accurate interchangeable work is likely to have one or more such tools upon its shelves.

Micrometers to measure 48 in. are, however, quite

A 48-IN. MICROMETER

another story. The one shown in the accompanying engraving was made by the J. T. Slocomb Co., of Providence, R. I., to fill a special order and had to be built "from the ground up." The measuring spindle, barrel and thimble are standard parts, the same as used upon all Slocomb micrometers of whatever size. The frame is a casting for which a special pattern was required, as nothing that large had been previously made.

The weight of the tool is 32 lb. In use it will be suspended from a special holding device that will counteract any tendency toward distortion by reason of its weight, and also make it unnecessary for the operator to grasp the frame with the hands, the natural heat of which would cause a noticeable distortion from expansion.

Recent Developments in Steel Forgings

By JOHN L. COX

Forgings replacing castings for parts of great size and weight—Alloy steel forgings—Hardened steel rolls—Hollow expanded and drawn forgings—Machine parts

THE engineer designing a machine requiring parts of unusual size, or operating under unusual stresses, is often confronted with the question whether or not such parts are practically obtainable. If there be a doubt in his mind, he is hardly at liberty to proceed along his chosen lines until after consultation with the makers, for should the parts require the construction of special plant or the development of special materials for their production, their cost would ordinarily be prohibitive.

Within the past few years, there has been a revolution in the construction of power plants. The reciprocating engine of 10,000 hp. has given way to the steam turbine of 87,000 hp. The Public Service steam boiler of 350 lb. pressure, of which a few were built in 1922, is succeeded in 1923 by the boiler of 1,200 lb. pressure. The 1,500-lb. boiler is under consideration here, and an experimental boiler for 3,200 lb. pressure is building in England. Such changes have required much consultation.

In many other directions units are being designed with parts exceptional in size or quality, which must be submitted to the steel manufacturer before confidence can be felt that they are procurable. A knowledge of the obtainable may make possible designs employing to advantage steel forgings in place of the more commonly used steel castings in parts of great size and weight, or encourage the growing tendency to employ the alloy steels in place of carbon steel in highly stressed forgings much larger than those in which their use has been customary, or influence a decision in favor of substituting hardened and ground forged alloy steel for chilled cast iron in rolls for cold rolling metals.

By the companies manufacturing armor, chrome-nickel steel has for many years been made into plates of great size, and most elaborate heat treatments have been devised to produce in them the qualities necessary for successful ballistic test. For this use, advantage has been taken of the exceptional toughness of this alloy steel rather than its possibilities for high-tension test figures, which are those largely employed in the manufacture of parts for automotive engines. Today, industry is availing itself of the widely variable properties of this alloy, or similar alloys, in forgings of considerable size. A notable instance of this is in the recent introduction of the use of chrome-nickel steel for columns of hydraulic presses, where carbon steel

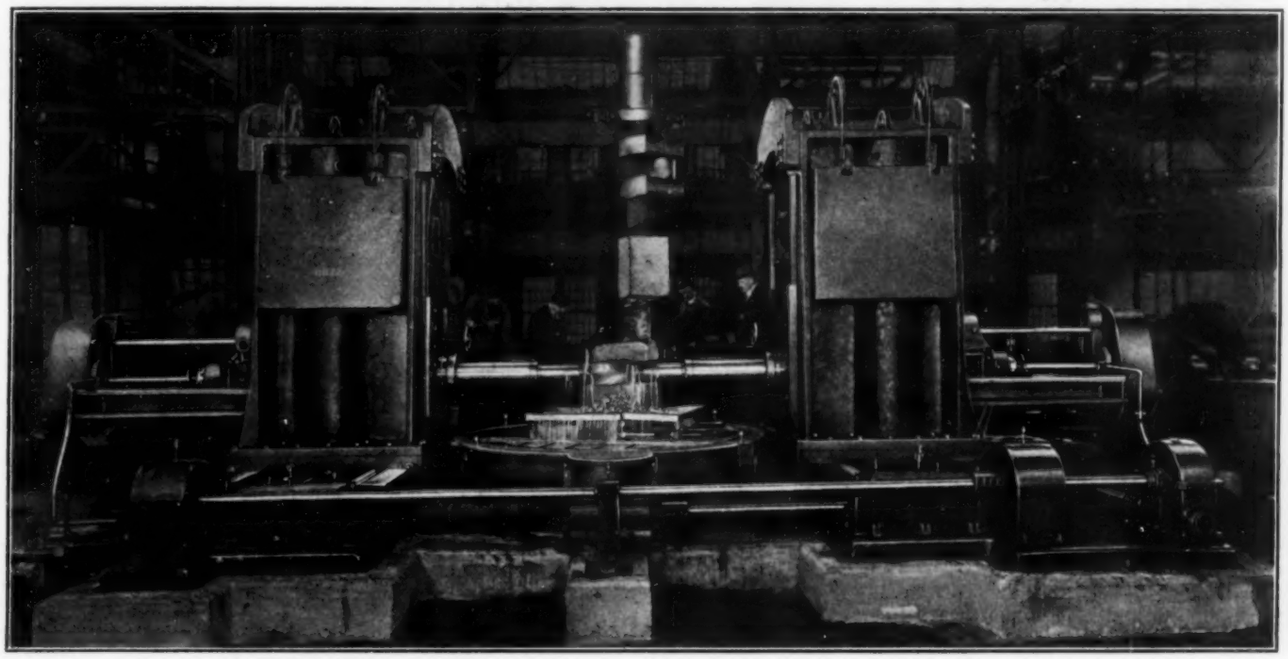


FIG. 1—OVERGAARD CRANKSHAFT MILLING MACHINE

Abstract of a paper read before the American Iron and Steel Institute, New York City, Oct. 25, 1923.

proved too weak and it was impossible to increase the diameters. Such columns are in successful operation today as large as 24 in. in diameter and over 36 ft. long. A treatment giving about 115,000 lb. per square inch tensile strength, 85,000 lb. per square inch yield point, 21 per cent extension in 2 in. and 55 per cent reduction of area, has answered well.

A very interesting use of the possibilities of chrome-nickel steel in pieces of considerable size is a hydraulic intensifier built to operate under a working pressure of 40,000 lb. per sq.in., and tested to 48,600 lb., which is well beyond the 21 tons per sq.in. maximum test pressure of a modern high power gun. Its components include the main vessel (showing tensile strength 143,500 lb. per sq.in., yield point 110,000 lb. sq.in., extension in 2-in. tangential bar 15.2 per cent, contraction of area 50 per cent) and subsidiary parts of various requirements, in one case showing tensile strength 173,000 lb. per sq.in., yield point 137,000 lb. per sq.in., extension in 2-in. longitudinal bar 15 per cent, contraction of area 53.9 per cent.

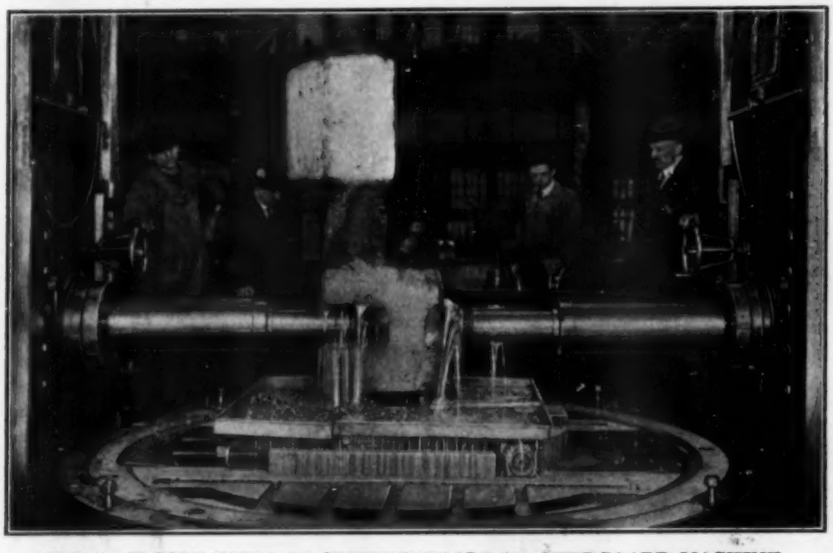


FIG. 2—CLOSER VIEW OF CUTTING TOOLS OF OVERGAARD MACHINE

Another interesting field in an active stage of development is the manufacture of hardened steel rolls. Formerly, nearly all cold rolling of strip and sheet metal was done with chilled iron rolls. In steadily increasing volume these are being replaced by heat-treated, hardened, slightly drawn, ground and polished rolls of alloy steel, usually chromium, chrome-vanadium, chrome-molybdenum, chrome-vanadium-molybdenum, or chrome-tungsten-vanadium. Fully hardened rolls of these alloys may be made much harder than chilled iron rolls, the hardness running in the neighborhood of 110 to 115 scleroscope. They take a much higher finish, produce a correspondingly better surface on the product, and are reasonably long lived if treated properly, as they deserve to be, for they are among the highest expressions of the steel-maker's art. They must not be allowed to run hot on the journals, or they may crack there; must not be struck on the working surfaces, or they will indent in spite of their hardness; must not be allowed to slip on the work, or local heating may cause spawls; must be kept slushed, or rust will ruin their mirror finish. Small rolls of this type have been on the market for many years, but as experience in their manufacture is being acquired and their merits are becoming appreciated, the sizes are increasing. Today, rolls about 25 in. in diam. by 40 in. in length of body are readily supplied in the hardest grades, and rolls as large as 28 in. by 120 in. can be furnished with scleroscope readings of about 80, or over. No doubt, in time, skill and equipment will be available to produce these large rolls with a scleroscope hardness of over 100.

While no new principles have been developed in the manufacture of crankshafts of which I am aware, their production has been much facilitated by a new machine tool invented in Denmark. It consists of two opposed milling heads on horizontal shafts carried by housings, each with three adjustments and feeds at right angles to each other. Between them, over a pit, is a driven table provided with vise jaws adjustable towards each other and with reference to the axis of the table. Clamped between these jaws in a vertical position, adjusted properly with reference to their axes, the pins and webs of a crankshaft can be machined all over by the revolving cutters controlled by the feeds provided by the housings or by the revolution of the table. There results a great economy of time in the machining. Fig. 1 gives a general view of this machine and Fig. 2 more clearly shows its mode of operation.

In the production of hollow forgings of great diameter and short length, there has been little change for many years, but it may be of interest to know what has been done in this line. One particular ring is 137 in. in outside diameter, 109 in. inside diameter and 45 in. long, weighing 85,000 lb. Somewhat similar is the gear reduction ring for a turbine-driven steamship, the machined dimensions being 136 in. outside diameter, 124 in. inside diameter and 50 in. long. Such rings can be manufactured up to about 120 in. in length.

In the field of large hollow drawn forgings there have been very interesting developments both as regards size and character of forgings.

Recently there have been devised means for increasing the yield of gasoline from crude oil by the application of cracking methods. Depending upon the original character of the oil, this increase may be as much as 13 fold. The oil is heated to about 875 deg. F. under 500 to 600 lb. pressure while circulating through tubes in a furnace, and flows to a large insulated cylinder where the completion of the cracking operation takes place. This cylinder, or reaction chamber must stand heat, pressure, corrosion by sulphur in the oil, and be absolutely leak proof, for the gasoline under high pressure is well above its ignition point. The use of forged steel cylinders for this purpose has met with signal success. One of these was 46 in. outside diameter, 38 in. inside diameter and 36 ft. 11¾ in. long on the body, weighing 52,000 lb. in the rough. The ends were closed by heads and covers of cast steel, secured by heat-treated nickel-steel bolts and nuts. There was no leak under 2,000 lb. hydrostatic pressure applied for eight hours.

The disadvantages of a separate head were so evident, however, that it was next sought to make the head

integral with the body and this was successfully accomplished. The cylinder is now 41 ft. 2½ in. in length over all, weighing 79,000 lb. in the rough and requiring in ingot of 156,000 lb. in weight.

The cross drum of a new B. & W. boiler, designed for a maximum pressure of 1,200 lb. per sq.in., is a forged steel cylinder 48 in. inside diameter, 56½ in. outside diameter, and 34 ft. total length over the ends, which are closed in to take a 12x16-in. manhole cover. This is one of the largest hollow forgings ever made; the forged weight being 162,000 lb., requiring an ingot of 262,000 lb. to allow for scrap and losses. The billet was cut hot from a 78-in. octagon ingot, was stood on end and upset to about 96 in. in diameter, had a 23½-in. core removed with a hollow punch, was expanded to about 50 in. in inside diameter, drawn on a mandrel to 45 in. inside diameter, 58½ in. outside diameter, annealed, tested, machined inside and out, and after closing-in is to be reannealed, have the throat machined to 11¾ in. inside diameter and the exterior of the head trued up.

Shortly before the World War began, the Midvale Steel Co. began construction of a 20,000-ton forging press. The entablature was to consist of two main steel castings bolted together. After the first half of the entablature had been cast, various considerations led to a decision to substitute nickel-steel forgings for the carbon-steel castings first planned. No such design could have been confidently elaborated without knowledge that its main components were procurable and available for use.

The forging was 12 ft. wide in the center, about 9 ft. wide at the ends, 4 ft. thick at the column bosses, decreasing to 1½ ft. thick at the center, and about 28 ft. over all. This forging weighed 289,000 lb. and was produced from an ingot weighing 458,000 pounds.

The press of which this forging is to form a part has not been completed. It awaits a call from engineers of the country for forgings larger than those entering into its own construction, since the treaty for the limitation of armament has for the present ended the work for which it was originally designed.

Cutting Speeds for Turning Wheels and Tires

In order to get the best results from high powered machines or high speed steel, it is necessary to know how fast the work must be run to secure the desired cutting speed. It is a long way around a large locomotive tire and it is not always easy to realize that it only takes two and a half revolutions of a 68-in. tire to give 45 ft. a minute. To make it easy to know just what is being done, the accompanying chart has been made. This shows wheel diameters from 32 to 90 in. together with circumferences and cutting speeds up to 100 ft. per minute.

Larger diagrams on heavy paper can be had on application to the *American Machinist.*

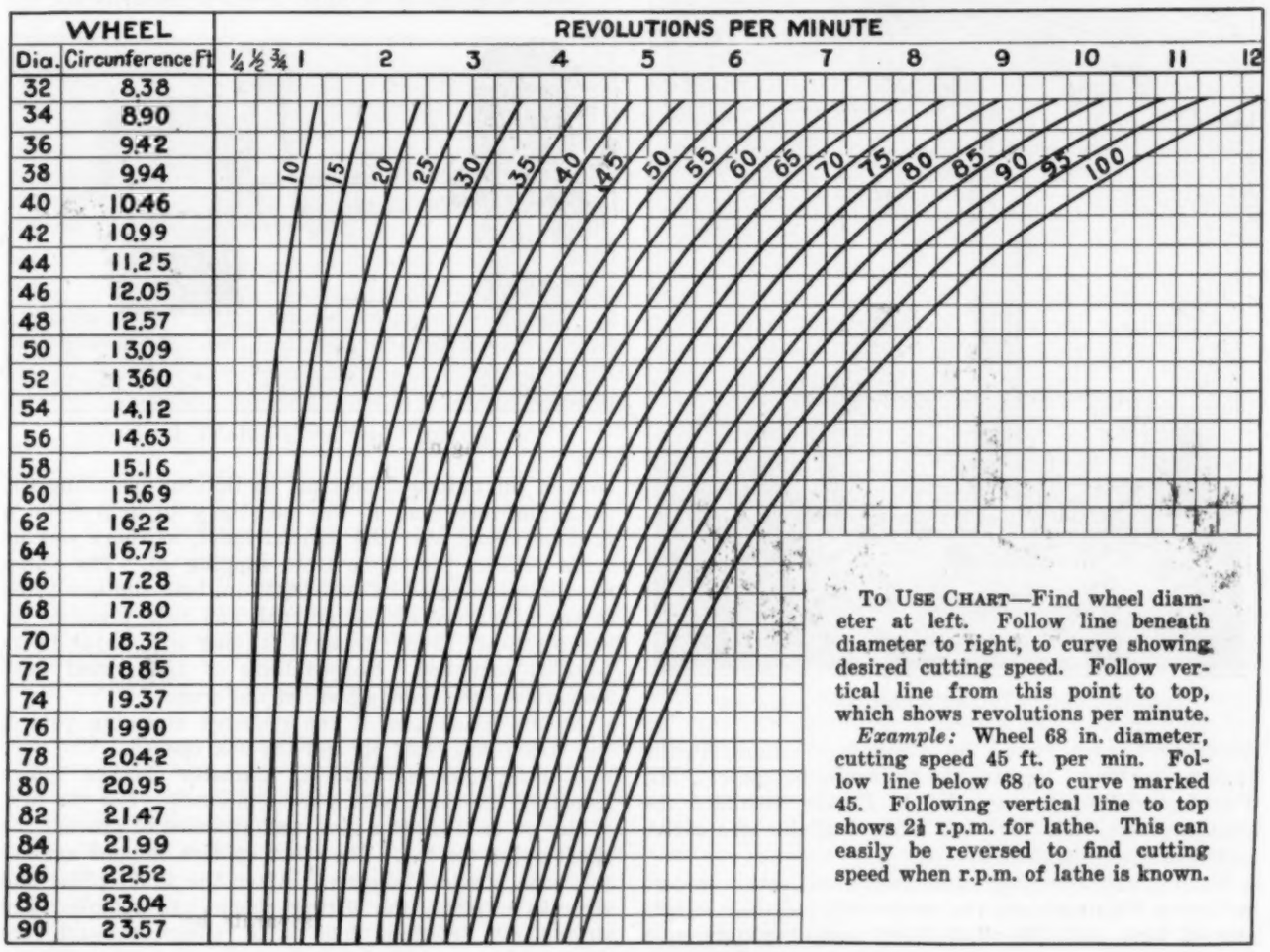

WHEEL
Dia.
Circumference Ft
REVOLUTIONS PER MINUTE
¼ ½ ¾ 1 2 3 4 5 6 7 8 9 10 11 12
10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
32 8.38
34 8.90
36 9.42
38 9.94
40 10.46
42 10.99
44 11.25
46 12.05
48 12.57
50 13.09
52 13.60
54 14.12
56 14.63
58 15.16
60 15.69
62 16.22
64 16.75
66 17.28
68 17.80
70 18.32
72 18.85
74 19.37
76 19.90
78 20.42
80 20.95
82 21.47
84 21.99
86 22.52
88 23.04
90 23.57
To Use Chart—Find wheel diameter at left. Follow line beneath diameter to right, to curve showing desired cutting speed. Follow vertical line from this point to top, which shows revolutions per minute.
Example: Wheel 68 in. diameter, cutting speed 45 ft. per min. Follow line below 68 to curve marked 45. Following vertical line to top shows 2¼ r.p.m. for lathe. This can easily be reversed to find cutting speed when r.p.m. of lathe is known.

DIAGRAM FOR CUTTING SPEEDS IN TIRE AND WHEEL TURNING

Ideas from Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for

Shrink-Fitting a Heavy Shaft Assembly

BY A. T. PARSONS

When installing the equipment for the hydro-electric plant of the Andhra Valley Power Supply Co., near Bombay, India, C. V. Foulds, field engineer for the Pelton Water Wheel Co. of San San Francisco, developed a novel method of assembling the shaft, rotor and water wheel runner. For the particular conditions of the job, this method proved much superior to the conventional press fit.

The plant comprises six 10,000-kva. General Electric

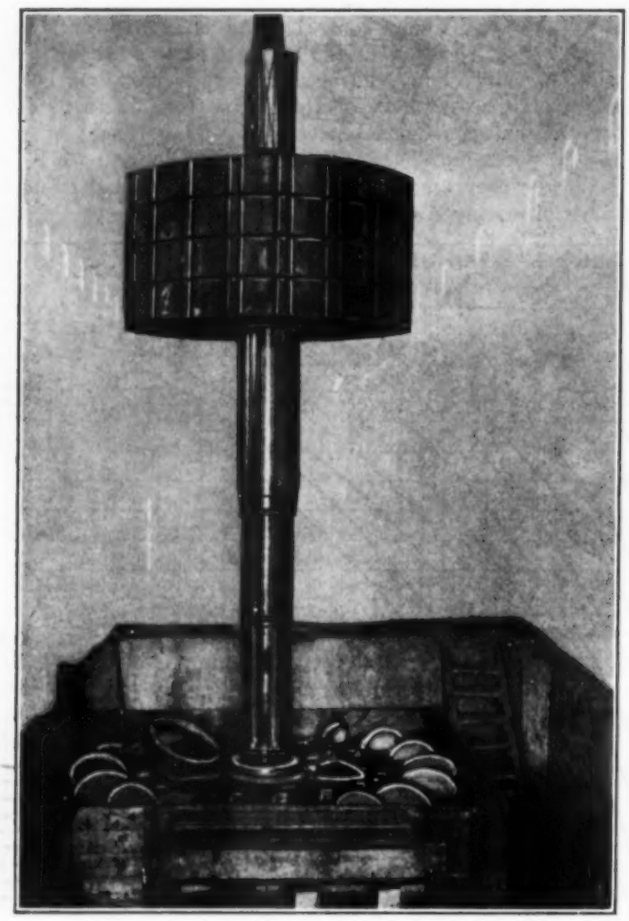


FIG. 1—SHRINKING RUNNER ON TO SHAFT

generators, each driven by a single overhung Pelton impulse turbine. Besides the hydraulic equipment, Mr. Foulds and his assistant, W. L. Parker, installed the generators as well. The only labor available was native and was mainly unskilled.

Each shaft assembly comprised four rotor spiders weighing 8 tons apiece, the water wheel runner weighing 12 tons, and the shaft itself weighing 9 tons—a total of 53 tons. The final assembly weighed 73 tons, but the twenty field poles for the rotor, weighing a ton apiece, were naturally not added until the rest of the assembly was completed. The bore of runner and spider hubs was 0.003 in. smaller than the shaft diameter, which was 22 inches.

Largely on account of the lack of skilled labor, it was decided to heat the spiders and runner by steam and shrink them on rather than employ the usual press-fitting methods. However, events proved that shrink-fitting would have been advantageous irrespective of the character of the labor supply.

A "steam box" large enough for one of the rotor spiders was constructed, and a spider lowered into it. Steam was then supplied by a 1-in. pipe from a donkey boiler outside the building. Four or five hours of steaming was required, which increased the diameter of the bore from 0.003 in. less than the shaft to 0.012 in. more. Further steaming made only a slight additional increase, the time allowed being apparently sufficient to bring the spider up to approximately the temperature of the steam.

The first spider to be applied was necessarily the one

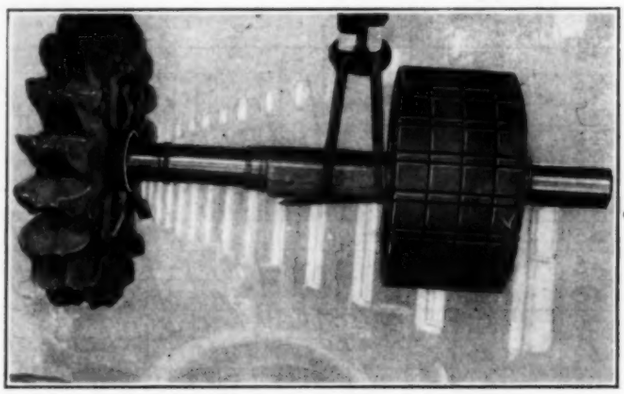


FIG. 2—THE COMPLETED SHAFT ASSEMBLY

next to the outboard bearing, so that in up-ending the shaft for insertion, it was necessary to grip it by a friction clamp over the journal itself, as there was no collar to keep the clamp from slipping off. The clamp used was composed of two 12x12-in. teak timbers fitted to the curvature of the journal, and held together by two pieces of 12-in. I-beam 3 ft. long with three 1¼-in. bolts at each end. Forged links of 1¼-in. steel were looped over the double hook of the crane.

At the conclusion of the required steaming period, the steam was shut off and the box opened. The bore was then wiped out and its diameter checked before inserting the shaft, which went in easily. For the first spider on each shaft a stop was attached to prevent the shaft going too far. The other spiders stopped against the ones already in place. After the first spider had shrunk in place, the lifting clamp was removed and subsequent hoisting done with slings through the spider.

To guard against looseness in the main key and to insure alignment of the pole slots of the four spiders, a long key with one end tapered was made to fit the slots, and as each pair of spiders came together it was inserted and left in place until the last spider to be added had cooled and gripped the shaft. The time of cooling was prolonged as much as possible, 12 hr. being usually allowed, although the hub commenced to grip the shaft after one hour.

Aside from the cleaning and preparation of hubs and shaft that would be required whatever the method of assembly employed, the actual work for each hub required one man for 8 hr. to tend the boiler and the crane, and four men for 2 hr. to make the insertion and later to withdraw the assembly and place another spider in the box. The same procedure was followed for the turbine runner except that a slightly larger steam box was required and 7 hr. steaming instead of five. The steam box is shown in Fig. 1. In one instance all five hubs were set on a shaft in as many days.

When the shaft assembly, weighing 53 tons, had been completed and was hanging from the crane with the turbine runner down, an overhanging step was provided on one of the pit walls, on which was rested the outer hub of the runner, permitting the entire assembly to be lowered to a horizontal position without placing any weight on the buckets. The assembly was then lifted, as shown in Fig. 2, and placed in its bearings.

An Ancient Thread Milling Machine

BY JACK WILLIAMS

That the principle of thread milling is not exactly new is attested by the existence of the device shown in the accompanying cut, which was built more than fifty —and probably more than sixty—years ago and is still doing business whenever its services are required.

This machine was never "designed," but was built in the shop where it is used from old parts such as can be found in most any machine shop. The legs may have been cast for the purpose, but it is more likely that they were originally intended for pedestal bearings for some other mechanism; such as a tumbling barrel or a polishing jack. The tie-bar that holds them together is a piece of wrought-iron pipe, to which all the other parts are fastened by clamps or collars that surround the pipe and are drawn snug by clamping bolts or held by setscrews.

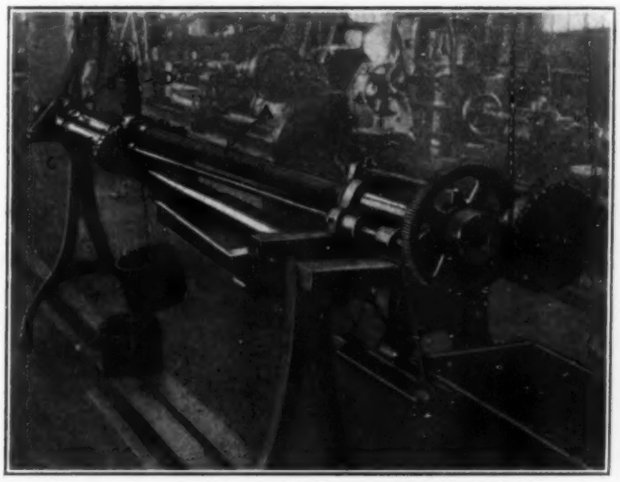
Part *A* is the master screw, at the farther end of which is a plain collet, or chuck, in which the piece to be milled is fastened by means of setscrews in lieu of chuck jaws. It will be observed that the axis of the master screw lies at an angle across the tiebar and that the work piece, when attached to the screw, becomes in effect an extension of the latter and rests in the ring *B* of a bracket that is clamped to the tiebar at a point beyond the milling cutter and upon the other side of the center line. The milling cutter is directly under the bracket *C* and at the point where the axis of the combined master screw and work piece intersects the center line of the machine.

The angle at which the axis of the master screw and work piece crosses the tiebar is equivalent to the helix angle of the screw to be cut. In this machine the angle is fixed, as it is never called upon to produce other than the one thread for which it was built.

The milling cutter is at the end of a long arbor, or spindle, which extends from the far end of the machine, where it receives its driving power through a small belt and gear train. The "ring" of the bracket *C* is cut away at the lower part of its periphery and is fitted with a segmental bronze bushing in which the work takes a bearing. The work also passes through a ring suspended from the coil spring *D*, which holds it to a bearing against the upper side of the open bearing ring to prevent chatter. The work is exposed to the milling cutter at the point where the bearing ring is cut away.

The master screw is splined over its whole length and passes through the hollow spindle of the "headstock," which rotates it by means of the spline. It also passes through a stationary nut at the end of the headstock so that as it is rotated by the latter it is drawn endwise by the action of its own threads in the nut. When a cut is completed the screw extends for nearly its length from the rear end (nearest the observer) of the hollow spindle.

The action of the machine is obvious. As the master



A PIONEER THREAD MILLING MACHINE

screw is rotated by the headstock and drawn back by the action of its threads in the stationary nut, the work piece is passing with a corresponding movement over the milling cutter, which has no movement other than that of rotation. To adapt the machine to cut other diameters of thread, it would be necessary to provide means of swiveling the master-screw and work holder in relation to the center line of the machine. Any *diameter* of thread could then be cut, but it would still be necessary to furnish a complete master screw and nut to cut other leads.

The machine was built by the proprietors of the Higley Machine Co., South Norwalk, Conn., to cut the feed screw for the large size Higley cold sawing machine. As it was apparently more desirable to built another machine than to make this one adjustable, the shop has other machines of the same type to handle other sizes and leads of screws.

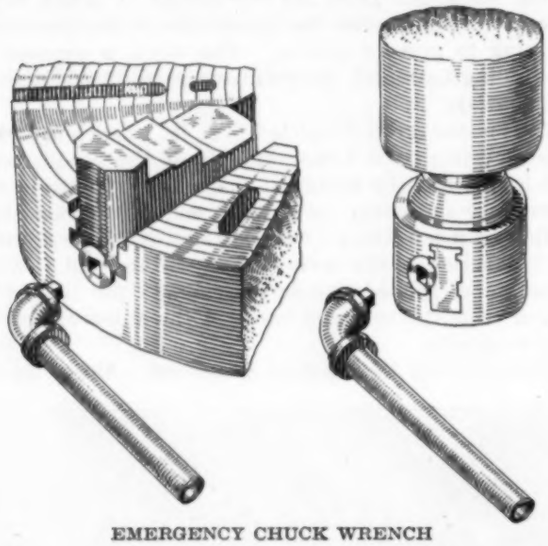
Notwithstanding its crude appearance the machine is quite efficient; doing its work so well and so quickly that the expense of a modern thread miller would not be warranted by any saving that the latter might accomplish as a single purpose machine, and it was on the job when the modern thread miller was but an inventor's dream.

Emergency Chuck Wrench

By Frank W. Bentley, Jr.

In spite of all that efficiency can accomplish, chuck wrenches will become misplaced, and until one can be found or another made, work is sometimes held up.

The sketch shows how an emergency wrench can be



EMERGENCY CHUCK WRENCH

made of pipe fittings in a hurry. The squares on the heads of the plugs are of various sizes from $\frac{3}{8}$ in. on the $\frac{1}{4}$-in. plug to any other size as the plug size is increased. The squares are hard and, with the plug firmly screwed into the elbow, a very satisfactory wrench is afforded. The pipe-stock racks can always fix you out when the blacksmith or the toolmaker can not.

Designing Cams for Automatic Screw Machines

By Ivan Svidlo

In designing cams for B. & S. automatic screw machines the following steps should be taken:

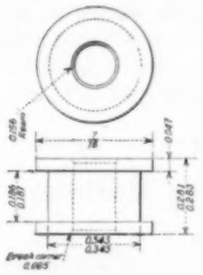
1. Determine the method to be used, in regard to tools and their respective location.
2. Determine the surface speed to be used.
3. Determine the revolutions per minute for spindle.
4. Calculate the throw for each tool.
5. Determine what feed per revolution should be used for each tool.
6. Calculate the number of revolutions for each actual working operation, such as turning, drilling, reaming, forming, etc.
7. Find total number of actual working revolutions to make one piece.
8. Find total number of lost hundredths of cam surface for feeding stock, indexing turret, clearance, etc.
9. Find total number of actual working hundredths of cam surface to make one piece.
10. Find total number of revolutions of a spindle to make one piece.
11. Find the time in seconds to make one piece.
12. Calculate the number of hundredths of cam surface for each operation.

I will explain only the method used to calculate items 7, 8, 9 and 10, as the balance of the information can be found in Brown & Sharpe's book entitled "Construction and Use of Automatic Screw Machine."

I recently had occasion to design a number of sets of cams, using the old method, which is to allow so many revolutions for feeding stock, indexing turret, clearance, dwell, etc. In order to find the total number of revolutions to make one piece, I had to add the number of revolutions for each operation, and in calculating hundredths of cam surface for each operation, I found that for feeding stock, indexing turret or clearance, etc., I had more or less than was necessary. In order to balance, I was obliged to add or subtract a few revolutions and then start my adding all over again. This was a very slow process, and I endeavored to find a more simple method of doing the job. I finally evolved the following rule:

Find total actual working revolutions to make one piece, that is, add the number of revolutions necessary for each actual working operation, such as turning, drilling, reaming, threading, etc., and let this total be represented by A.

Find total number of lost hundredths of cam surface for feeding stock, indexing turret, clearance, etc. The number of hundredths necessary for feeding stock or indexing turret can be found in the table for laying out cams in the book before referred to. Add these together, and let the total equal B. With this information at hand the total number of actual working hundredths of cam surface to make can be



PIECE TO BE MADE AND OPERATIONS PERFORMED BY THE MACHINE

		Rev.	Rise	Feed	Hundredths
Lead cam	Feed stock	....	.....	.....	4
	Index	....	.....	.....	4
	Center	20	0.060	0.003	5
	Dwell	...	.....	.....	2
	Index	...	.....	.....	4
	Drill	150	0.375	0.0025	36
	Index	...	.....	.....	4
	Dwell for recess	...	.....	.....	11
	Index	...	.....	.....	4
	Ream	43	0.344	0.008	10
	Cut off	61	.....	.....	14
	Clear	...	.....	.....	2
Front slide cam	Start at 19 hundred				
	Form	93	0.056	0.0006	22
	Dwell	...	.....	.....	2
	Clear	...	.....	.....	20
	Recess	20	0.040	0.002	5
	Dwell	...	.....	.....	2
Back slide	Start at 54 hundred				
	Cut off	185	0.185	0.001	44
	Clear	...	.....	.....	2

found by subtracting B from 100. This is corresponding to A in revolutions.

$$X:100::A:(100-B), \text{ or } X=\frac{100A}{100-B}$$

To make this more clear, let us take an example: Suppose we wish to make a piece as shown in the illustration. To make this part the machine will perform operations as shown on the table accompanying the illustration, forming being done during the drilling operation. Assuming that the first six items have

already been calculated, we will start with Item 7. To find the total number of actual working revolutions to make one piece, or *A*, we will add the number of revolutions necessary for centering, drilling, recessing, reaming and partially cutting-off. The reason we do not allow the full amount for cutting off is because this tool is operating at the same time as the other tools, but overlaps the reaming tool by 61 revolutions. Therefore:

$$A = 20 + 150 + 20 \times 43 + 61 = 294$$

To find total number of lost hundredths of cam surface: On Page 82 of Brown & Sharpe's "Construction and Use of Automatic Screw Machines," we find the hundredths of cam surface to feed stock or index turret for this job is 4; we allow 2 hundredths for dwell in centering, 2 in recessing, and 2 to clear cutting off, also allow 4 hundredths for dwell for recess over actual need. This gives us:

$$B = 4 + 4 + 2 + 4 + 4 + 4 + 2 + 4 + 2 = 30 \text{ hundredths}$$

To find the total number of actual working hundredths of cam surface to make one piece, we have to subtract *B* from 100, or 100 — 30 = 70, which will correspond to 294 in revolutions of the spindle.

Then *X*, or the total number of revolutions of a spindle to make one piece, will be:

$$X = \frac{100A}{100 - B} = \frac{29{,}400}{70} = 420$$

Accurate V-Blocks

BY W. S. HAINES

A V-block, to be both accurate and durable, should be made of tool steel, hardened and ground. In small sizes, it is possible to make such V-blocks in one piece, but in larger blocks the expense must be considered.

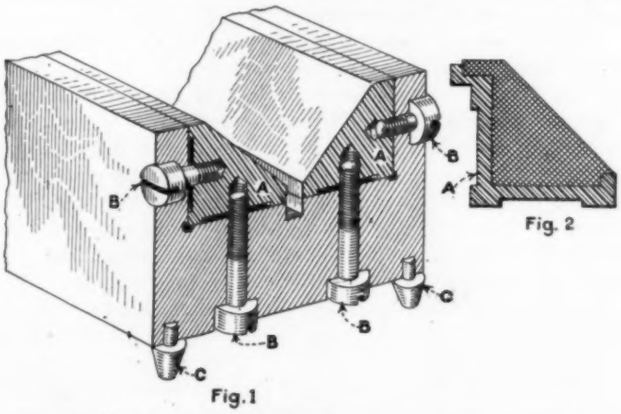


FIG. 1—V-BLOCK WITH HARDENED INSERTS. FIG. 2—V-BLOCK FOR POLISHED WORK

The V-block shown in Fig. 1 has a cast-iron body, while hardened and ground steel inserts *A* are used to form the V. The inserts should be recessed on the bottoms and sides, as shown, to insure a good bearing in the body. Screws *B* are used to hold the inserts in place.

The body is provided with feet *C*, to insure its taking a proper bearing on the machine table. The feet may be loose pieces attached to the body by screws and dowels, or may be shouldered pins driven in. In any case they should be hardened and ground parallel with the bottom of the seats for the inserts.

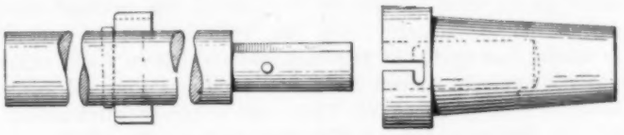
When holding soft, polished or nickel plated work, a set of inserts as shown in Fig. 2 can be made to replace the hardened inserts. The retaining shell *A* is made of tool steel and has babbitt metal cast in place as shown. The retaining shell need not be hardened, though it should be ground on the outside surfaces.

Holding a Boring Bar in the Tailspindle

BY C. L. JANNEY

Having occasion to use a number of boring bars in the lathe and not wishing to incur the expense of making a taper shank on each, I had recourse to the expedient shown in the accompanying sketch.

A single bushing with a straight central hole was



THE BORING BAR AND THE BUSHING

made to fit the tailspindle, and was slotted crosswise at the outer end. The slots at either side of the central hole were extended a short distance at a right angle in the direction of rotation of the lathe. The shanks of the bars were made a close fit for the hole in the bushing and fitted with a cross pin at the proper distance from the shoulder; the length of the pin being equal to the larger diameter of the bushing.

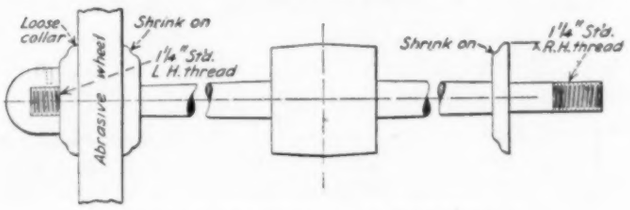
The pin locks the bar in position for boring and holds it against the turning moment of the cut. To remove a bar it is necessary only to give it a partial rotation backward and draw it out of the hole.

This method of fastening has the advantage of providing an easy means of taking a bar out of the work without drawing the point of the cutting tool over the finished surface.

A Safety Grinding-Wheel Arbor

BY RUSSELL C. LEGO

The sketch shows an improved form of double-end arbor to carry two grinding wheels on the regulation floor stand. End play is taken care of by the opposed taper journals, and if suitable shims are placed under



SAFETY GRINDING-WHEEL ARBOR

the caps when pouring the babbitt any looseness that may become manifest in service may be corrected by removing some of the shimming material and tightening down the caps.

The round nuts on the ends of the arbor constitute the safety feature. They are polished all over and are set up by means of a spanner. As the threaded ends of the arbor are completely covered and there are no corners or angles upon the nuts, there is no place where loose clothing may be caught.

American Machinist
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KENNETH H. CONDIT AND FRED H. COLVIN
Editors
November 29, 1923

What Are Normal Conditions?

A BULLETIN recently issued by one of the well-known statistical bureaus raises the question once more as to what should be considered the normal condition of an industry. In the bulletin the statement is made that many of the conclusions drawn from comparing present prices of farm products and all commodities with those of 1913 are entirely misleading. Why? Because prices of farm products in 1913 were abnormally high on account of short crops.

If one goes deeper into the subject and takes such a year as 1900, or such a period as 1890-1900, as a base, relations are exactly reversed. With either of these bases of comparison farm prices are found to be relatively higher in 1923 than general commodity prices.

Assuming that it is fairer to use as a basis of comparison a ten-year period such as 1890-1900 rather than a single year such as 1913 when conditions were somewhat unusual the cold figures afford little comfort to the "radical" members of Congress who are weeping over the farmer's misfortunes and decrying the grasping industrialists.

There is no question but that farmers who are trying to get returns on ill-advised investments in lands bought at speculatively inflated prices are up against it. But are they any worse off, or in a situation so very different, than the manufacturer who has had to face the readjustments of post-war conditions with an expensive plant built at war-time prices and several times too large for present requirements?

It all comes down to the question as to what constitutes normal conditions. Average statistics are of little use unless they can be compared with some base. If the base taken is not correct the whole comparative structure falls to the ground and the conclusions drawn are apt to be worse than misleading.

Why Not A Law-Repealing Body?

THE IMPENDING convening of Congress is being eagerly awaited all over the country. Much new legislation will be proposed and some old bills that have failed before will be put in again.

President Coolidge's first message to Congress will be critically scanned.

The actual power of the "radical" group about which there has been so much speculation will finally be tested. And there will be the usual flood of bills, wise and otherwise.

Comparative records of our own with foreign law-making bodies indicate that as producers of ill-considered and unenforceable laws we are without equals. Our lawmakers can turn out several times as many laws in the same number of weeks as can any others in the same line of business. But there seems to be no way of repealing the many out-of-date, useless and superseded laws that clutter up the statute books.

It is probably utterly hopeless to think of attempting to curtail the number of bills that will become law before this session of Congress ends, but wouldn't it be a great help if no law could be passed without repealing some old one that was no longer necessary? This idea is probably Utopian, it would make many of our lawyers jobless and it might result in some good legislation being lost, but wouldn't it simplify matters?

Writing Insurance On Industrial Preparedness

FIVE YEARS ago America celebrated by far the most fervent Thanksgiving Day of recent times. The Great War was just over and everybody was devoutly thankful to be released from the strain and worry of war preparation even though he had not been called upon to risk his life in national service. Most people looked forward to the return of peace without the faintest idea of the drastic political, economic and industrial readjustment that must accompany it. The chaos in Russia, the disintegration of Germany, the Fascist movement in Italy, the unemployment problem in England were hidden behind the veil of the future.

But today, five years later, we have learned by sad experience that the economic problems of peace may be as difficult of solution as those of war. The high, unselfish war spirit hardly outlived the sound of the last guns. It got its deathblow during the final bickerings over the terms of the treaty of peace and has been sorely missed in the struggles that followed.

Among the sad lessons of the war was the discovery that soldiers can be trained and placed in the field about a year before the materials of modern warfare can be supplied in sufficient quantities. After the echoes of war had died out and we could take an inventory of our contributions to the Allied cause we awoke to the rather unpleasant truth that our contributions of war material had hardly been as large as we thought. We had made every possible effort but we had not realized the time necessary to get going.

Apparently the lesson has been learned and we can be thankful that steps have been and are being taken, under the National Defense Act, to prevent a recurrence of the failure. Some of them are outlined in the first article this week. In it the Assistant Secretary of War, Dwight F. Davis, tells what has been planned and asks for the help of the men in industrial lines who would have to assume the burden of munition manufacture in case of another disturbance.

Perhaps plans for the mobilization of industry to prepare for war do not form the most cheerful subject in the world to be thankful about at this season of the year. At the same time an occasion may arise when we will be most thankful for those early preparations that are now being made. Insurance seems rather a burden when one is paying premiums but it looks very different when a claim is being settled.

Shop Equipment News

Walker Single-Stroke Vertical Rotary Surface Grinding Machine

The O. S. Walker Co., Inc., Worcester, Mass., has recently placed on the market a vertical, rotary, surface-grinding machine that embodies a number of distinctive features. It is especially intended to perform the face grinding operations upon disks of steel or other material (of which the standard metal saw is a familiar example) but can be used also in surfacing small machine or tool parts that may be arranged upon and held by a magnetic chuck.

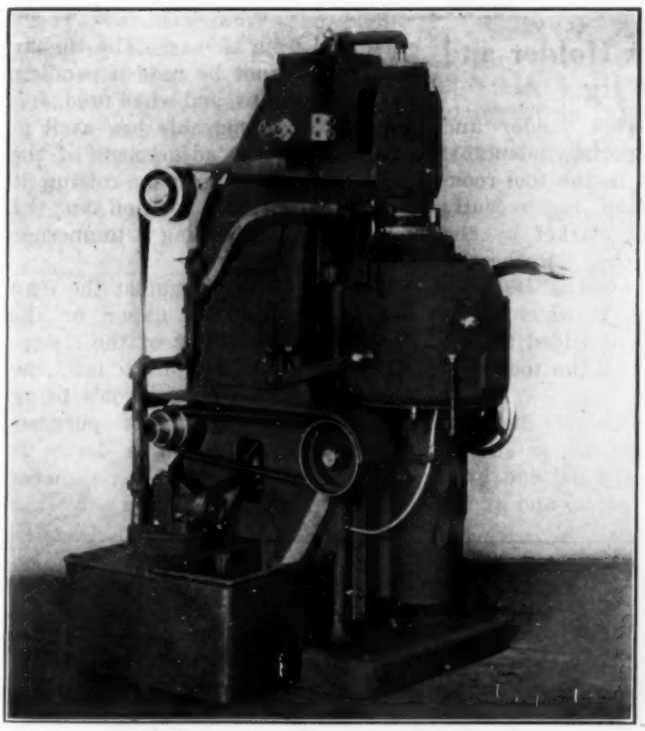
The grinding medium is a cup wheel having a rim section 3 in. deep by $\frac{3}{8}$ in. in radial thickness, mounted in a specially constructed holder which permits a reduction in depth of rim section of $2\frac{1}{4}$ in. by wear and redressing before the wheel need be discarded. The design of the holder is such as to prevent segments from being thrown out in case of wheel breakage.

The wheel-holder is attached by four easily accessible screws to a faceplate upon the lower end of a vertical spindle, the spindle running upon ball bearings in a vertically sliding head. This head takes its bearing directly upon the face of the column, to which it is fitted by means of the usual dovetail and tapered gib for adjustment. This bearing is 24 in. in length. Movement of the head is accomplished through the medium of a hand lever and a range of 5 inches is available. Positive stops limit the downward movement of the head in two positions. A counterweight within the column balances the weight of the head and its attached parts, so that the movement is free in either direction and the wheel will remain in any position in which it may be left.

The thrust of the wheel is borne by two Gurney radial thrust bearings and the weight of spindle and wheel is over-balanced by compression springs located in the upper bearing housing, so that backlash is always taken out in an upward direction.

The wheel spindle is driven by a 3-in. belt, running over idlers from the horizontal driving shaft in the base of the machine. A guard covers the belt at the point where it passes over the spindle pulley, thus preventing not only injury to the belt from the splashing of grinding compound, but also protecting the operator from injury by reason of accidental contact with the belt or rotating parts.

The work spindle carries at its upper end a standard Walker 12-in., rotary, magnetic chuck, the face of which is the work table. The upper bearing of the spindle is tapered to insure permanent alignment and ample bearing surface, and is located as closely as possible to the chuck. The lower end of the spindle is carried by a radial ball-bearing. The head in which the work spindle with its appurtenances is carried is a



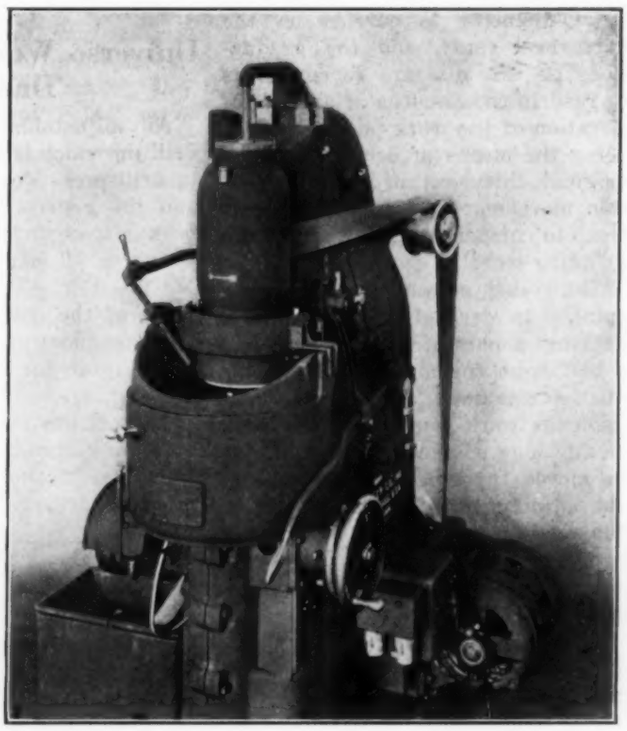


FIG. 1—WALKER SINGLE-STROKE GRINDING MACHINE. FIG. 2—FRONT VIEW OF WALKER MACHINE SHOWING CHUCK AND WATER GUARD

complete unit, attached to face of the column by means of a swiveling joint and opposed adjusting screws in such manner that the alignment of the work spindle relative to the wheel spindle is easily and quickly adjustable. Such adjustment is necessary to adapt the machine for concave grinding (as with circular saws) and for convex grinding, as well as for parallel work faces.

When this adjustment has been made the unit remains rigid with respect to the column, but the bearings of the work spindle are carried in a sleeve within the unit, which sleeve is capable of movement in a direction parallel to the axis of the spindle through a maximum distance of 4 inches. The sleeve is actuated through the medium of a hand-wheel, miter-gears and a screw.

This movement, supplemented by the difference of two inches obtained through the different settings of the positive stop on the wheel head, is the range of thickness to which work can be ground. A dial of large diameter is carried on the handwheel shaft, and the graduations on this dial are so spaced as to read in thousandths of an inch of elevation of the work table. Besides being the means of determining the original thickness of work pieces, this movement provides for adjustment to compensate for wear of the grinding wheel.

The rotary movement of the work spindle is derived through helical gearing, a pair of 3-step cones, and a belt from the main driving shaft of the machine. The driven gear upon the work spindle is made sufficiently long so that the spindle may be moved through the full range of its adjustment without disturbing the relation of the gear.

The main driving shaft may be equipped with tight and loose pulleys and a friction clutch for a belt drive from overhead or, as shown in Fig. 2, may take its power from an independent motor attached directly to the machine base and driving by silent chain. For motor drive the clutch is omitted and the machine is controlled by the starting box.

A centrifugal pump for handling grinding compound is attached as a unit to the base of the machine and takes its power through gearing directly from the main driving shaft. It is always running when the machine is in motion, regardless of whether the work spindle is running or stationary. A 14-gal. tank, fitted with baffle plates and a settling compartment, provides ample capacity for the compound.

The movement of the grinding wheel to the work is accomplished by a single downward sweep of the hand lever until the wheel head comes to rest against the positive stop, at which point the grinding is completed. Hence the name "single-stroke."

When the wheel head is in its upper position, the work spindle is stationary and the energizing current is cut off from the magnetic chuck. The first part of the downward movement automatically closes the electric circuit through the chuck and at the same time starts the work spindle in motion. As the wheel head is raised from the work the automatic switch sends an instantaneous current through the coils in reverse direction and thus completely demagnetizes the chuck.

Ordinarily the chuck is stopped and demagnetized when the grinding head is up, and energized and in motion when the head is down. An auxiliary lever at the left of the machine provides means for stopping and starting and at the same time, magnetizing or demagnetizing the chuck, regardless of the position of the grinding wheel. This is wholly an emergency control.

Fig. 1 shows the left side of the machine and Fig. 2 is a front view, showing the movable water guard in its lower position with the wheel and chuck exposed for unloading and reloading.

The speed of the grinding wheel remains constant at 2,200 r.p.m., giving a surface speed of 4,200 ft. per minute. There are three speeds of the work spindle, 30, 50 and 75 r.p.m., obtained by shifting the small belt upon the cones.

The machine with driving motor occupies a floor space of 53x50 in., and weighs 4,200 lb. net. A 7½-hp. motor, running at 1,750 r.p.m., is best adapted to meet the requirements.

Universo Work Holder and Drill Jig

An adjustable work holder and drill jig which is especially adaptable to drill press work in the tool room and the general shop, has recently been placed on the market by the Universo Tool Corp., Rochester, N. Y. Fig. 1 shows the essential parts of the device, to which other appurtenances may be added to suit the purpose for which the tool is to be used.

A short jaw is adjustably mounted on a long stationary jaw as shown, connected at the left-hand end by a toothed bar and a guide, and at the other end by a tie-bar. The tie-bar may or may not be used depending on the conditions, and when used, follows the short movable jaw as it is adjusted. Quick adjustment of the short jaw is obtained by raising it slightly from its position on the notched bar and sliding it to another position.

Work is clamped against the long jaw, either on the upper or the lower edge, by means of the clamping screws on the short jaw, the screws shown on the long jaw being provided for adjustment purpose. As shown in Fig. 1, the device is intended for holding single pieces which are laid out by hand and takes

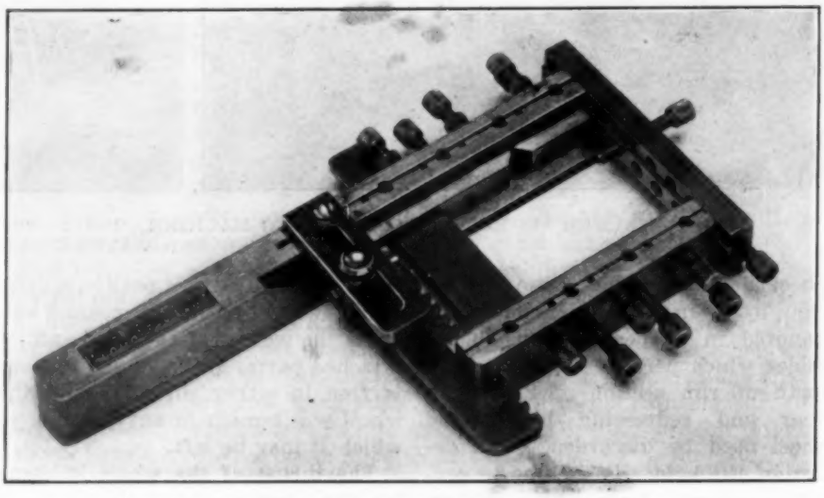


FIG. 1—UNIVERSO WORK HOLDER AND DRILL JIG

the place of the vices, clamps and straps used in various places to hold work on the drill press. The lower ledges may be removed, if desired, so that the work may be laid on the table.

A movable stop is shown in Fig. 1

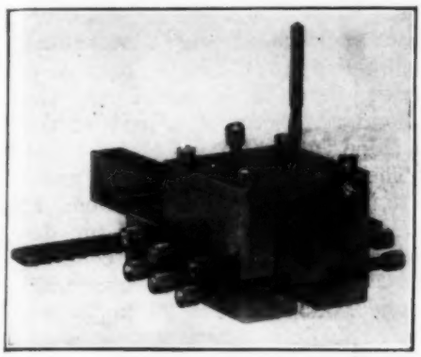


FIG. 2—UNIVERSO JIG FOR ROUND STOCK

attached to the long jaw above the toothed bar, and may be adjusted to bear on an irregular-shaped piece at the most convenient point. The use of the tie-bar also permits the clamping of the piece at a point directly opposite the stop.

Distance pieces, a V-block, and a jig plate may be added to the device, as shown in Fig. 2, making a box jig for drilling round stock. The adjustable stop is set to provide the proper length of stock beyond the

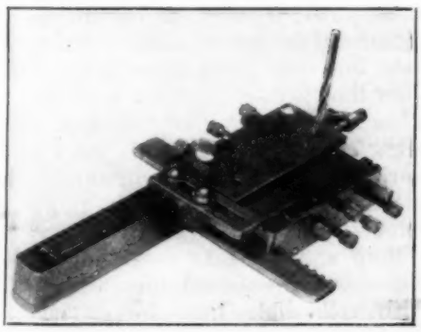


FIG. 3—UNIVERSO JIG FOR FLAT WORK

hole to be drilled, and the piece is then located by pushing it against the stop and clamping it with one screw.

A variety of pieces and attachments such as these can be furnished by the manufacturer of the device and others can be easily made in the shop or tool room to suit special requirements.

The work held in the jig in Fig. 3 is clamped on the upper ledge with a template or jig-plate fastened to the stationary jaw. The template is mounted so that it may be swung out of the way to permit countersinking or similar operations. A swinging clamp is fastened to the end of the long jaw and is used for clamping the work against the stop.

Many other combinations of standard and special pieces are possible.

Cincinnati 3-Way Open-Side Planer

A special open-side planer, having three ways instead of the usual two, has recently been built by the Cincinnati Planer Co., Cincinnati, Ohio. The accompanying illustration shows the position of the ways, together with the back of the knee and rail.

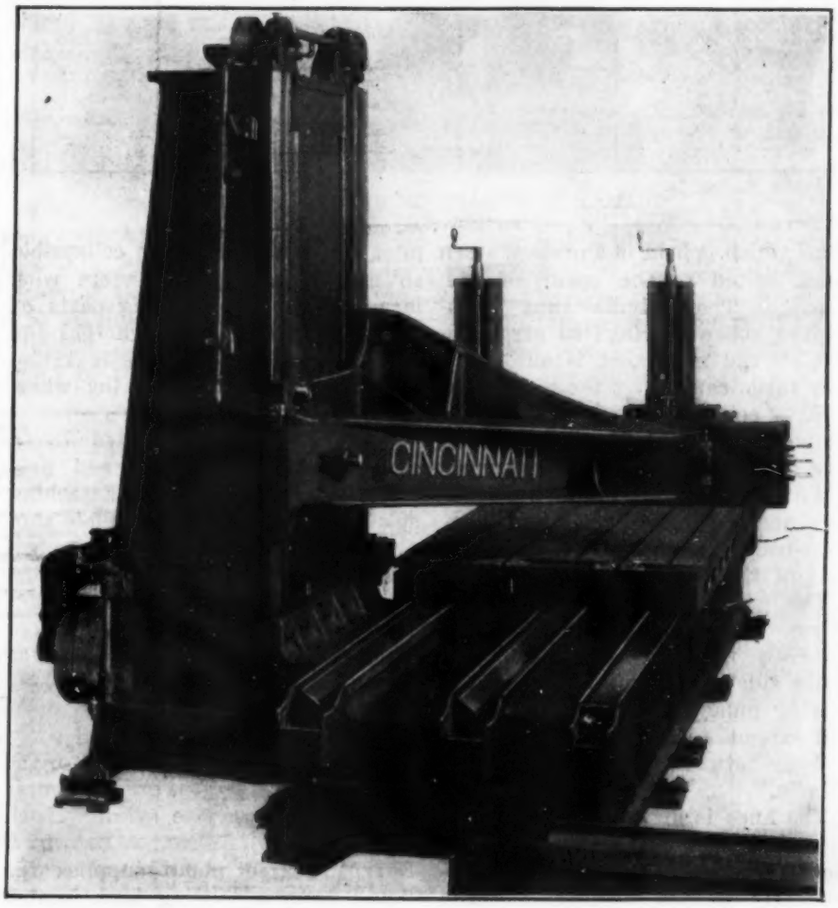
Two of the ways are V-shaped and one is flat, giving wide support to the box table, which is also equipped with a table clamp and inner guides. This construction is to avoid any liability of the table lifting or tilting out of the track. The top surface of the table is provided with five T-slots for clamping purposes. The ways are lubricated by a force feed system, employing a reversible pump which forces the oil into the ways directly under the cutting tools. Before being used again, the oil is settled and strained to avoid the possibility of dirt getting into the ways.

The rail is of the extended type and constructed to allow heavy cutting at the extreme end. The knee is bolted and doweled securely to the rail and may be clamped to the column by full-length T-blocks.

The heads are equipped with rapid power traverse in all directions and are made of sufficient length to permit planing some distance below the rail. The heads are so constructed that the slides have a full bearing at all times and the down-feed screw is always in tension. The rail has a power elevating device for raising and lowering, and a limit stop prevents raising the rail above its maximum height.

The column is braced and ribbed on the inside to prevent distortion and, in addition to being bolted and doweled to the bed, is also held in position by a large tongue cast integral with the bed. This tongue fits a groove in the column.

The side head is also equipped with rapid power traverse and the slide is equipped with a handwheel for feeding.

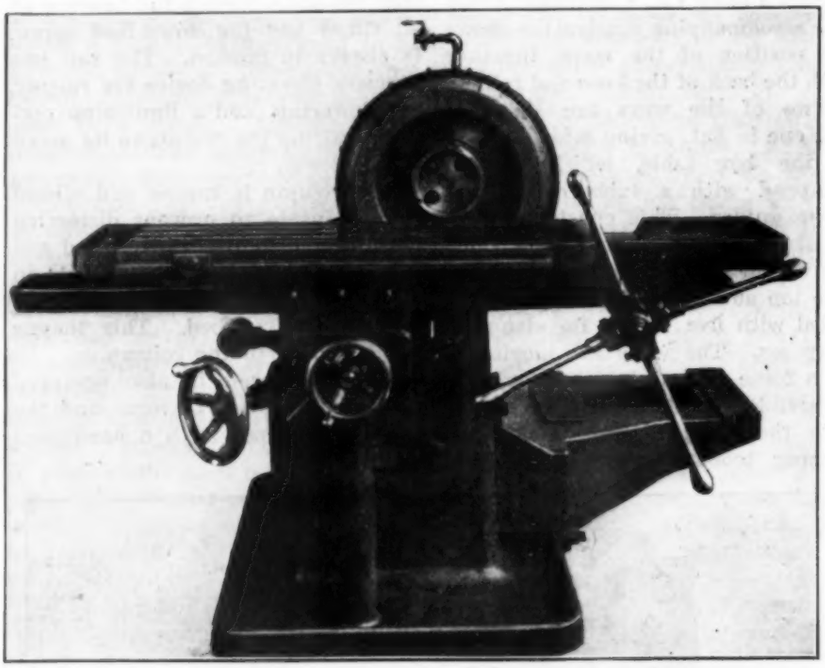


CINCINNATI 3-WAY OPEN-SIDE PLANER

Graham 18-In. Face Grinding Machine

The Graham Mfg. Co., 71 Williard Ave., Providence, R. I., has added to its line the 18-in., knee-type, face grinding machine here shown, which in addition to its increased capacity presents some features that were not included in the smaller machine of the same class, illustrated on page 532, Vol. 55, of the *American Machinist*.

The machine swings an 18-in. ring wheel which is held in a pressed steel chuck bolted to the collar of the spindle. The spindle runs upon Timken roller bearings so arranged that all end movement is automatically taken care of by the tension of a heavy coil spring. Adjustment to compensate for wear is provided by ring locknuts. Felt washers exclude dirt and abrasive dust from the bearings and the latter are fitted with glass-body oilers to indicate the level of the lubricant.



GRAHAM 18-IN. FACE GRINDING MACHINE

The machine is arranged to be driven by a motor which is permanently mounted upon a bracket at the side of the column. From the driving pulley of the motor a 6-in. belt extends to a 9-in. pulley located midway between the bearings of the spindle.

The knee is gibbed to the face of the column and has a vertical movement of 8½ in., actuated by a conveniently located handwheel. The saddle has a cross movement in a direction parallel to the axis of the wheel spindle of 3½ in., and is also actuated by a handwheel and screw, the latter fitted with a micrometer dial to facilitate exactness of setting when duplication of parts is desired.

The table presents a work surface of 13x44 in. and has four ⅝-in. standard T-slots for attaching work pieces, jigs or fixtures. It has a traverse of 24 in., actuated by a pilot wheel that is made collapsible so that it may not interfere with large pieces or projecting parts of work. At its maximum height the surface of the work table is 1½ in. below the center line of the wheel spindle.

The table is surrounded by a generous water channel and provided with means for attaching splash guards so that an ample supply of cooling liquid may be directed upon the point of contact between wheel and work. An extension bracket provided with raised edges is bolted to the end of the table to catch any liquid that may overflow because of long or overhanging work. Below the table are permanent basins attached to the saddle and drained toward the center to carry any possible overflow back to the tank. A No. 2 Brown & Sharpe geared pump supplies the liquid from a settling tank located within the column of the machine.

The abrasive ring, or ring wheel, is 18 in. in outside diameter, 4 in. deep and has a 14-in. hole. The rotative speed required may vary somewhat in accordance with the nature of the work being done but should average around 1,200 rev. per min. The drive may be from overhead countershaft or independent motor, and for the latter purpose a motor base is attached to the column and becomes a part of the machine.

The machine requires a floor space of approximately 3x4 ft., stands 42 in. high, and when crated for domestic shipment with either countershaft or motor base, weighs 5,000 pounds. From 15 to 20 hp. is required to drive it.

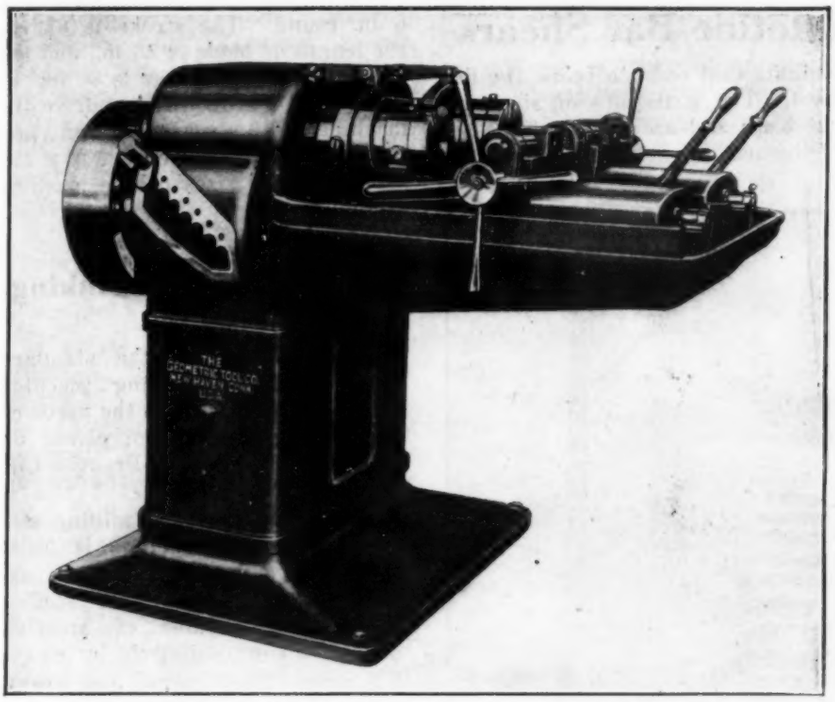
Geometric 1½-In. Double-Spindle Threading Machine

A 1½-in., double-spindle threading machine has recently been added to the line of threading machinery and tools manufactured by the Geometric Tool Co., New Haven, Conn. The machine is similar in construction to the ¾-in. double-spindle machine previously described on page 388, Vol. 54, of the *American Machinist*.

This larger size machine, like the smaller size, is designed for threading work in which the threading time for each piece is sufficient to allow the operator to chuck and start a second piece while the first is being completed. For this class of work the double-spindle machine is practically as fast as two single-spindle machines.

Both spindles may be fitted with dieheads for external threading, or with collapsible taps for internal work. Also one spindle may carry a tap and the other a die, for work that requires both an internal and an external thread. A high-speed tapping device can be furnished for tapping holes which are too small to permit the use of a collapsible tap.

The spindles are mounted in bronze bearings and driven by a single pulley, but may be driven independently by means of the change gear levers. These levers also control the spindle speeds and can be set to furnish the proper speeds for the threads being cut. The machine will cut threads of the following diameters: ¾, ⅞, 1, 1¼ and 1½ inches.



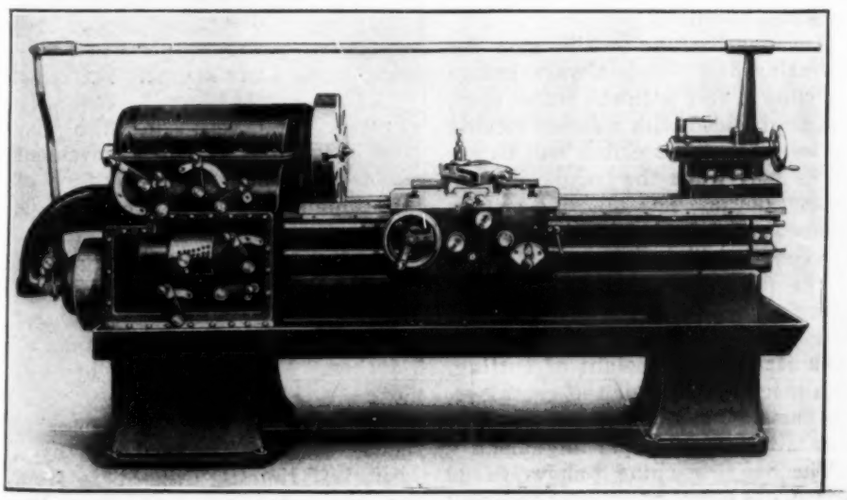
GEOMETRIC 1¼-IN. DOUBLE-SPINDLE THREADING MACHINE

An adjustable swinging gage on the side of the carriage governs the opening of the diehead and the length of thread to be cut, and an adjustable stop back of the carriage controls the closing of the diehead. The greatest length at which the swinging gage can be set at one time is 9 in., but with resettings a length of 14 in. can be obtained.

The recommended countershaft speed is 296 r.p.m. The floor space required is 48x65 in., and the net weight is 2,165 lb. The machine can also be fitted for motor drive, in which case a 6-hp. motor is required.

Walcott Low-Drive Lathe

The Walcott Lathe Co., Jackson, Mich., has just brought out its "Low-Drive" lathe that is here illustrated. The outstanding feature of the machine is the drive mechanism, which is different from that usually employed in lathe construction, and which is stated to greatly reduce vibration. The single driving pulley with its clutch can be seen low down at the head end of the lathe. The driving mechanism is located directly under the spindle below the ways of the lathe. Among the advantages claimed for the construction are simplicity, rigidity and a low center of gravity. The belt pull comes much nearer the center of gravity, and hence has less disturbing effect than when the driving pulley is high up on the head. The clutch can easily be operated from any part of the lathe by the overhead shifter rod.



WALCOTT LOW-DRIVE LATHE

Among the other important features are the following: The headstock, bed and gear box containing the working parts of the head are cast in one piece, assuring rigidity and also being oil tight. All gears and shafts are flooded with oil by means of a geared pump, which insures lubrication of the working parts. All the gears are contained in a single housing, thus eliminating overhanging gear boxes and making the head symmetrical and pleasing in appearance, as well as smaller in size. A three-point bearing is employed to secure proper alignment of the bed.

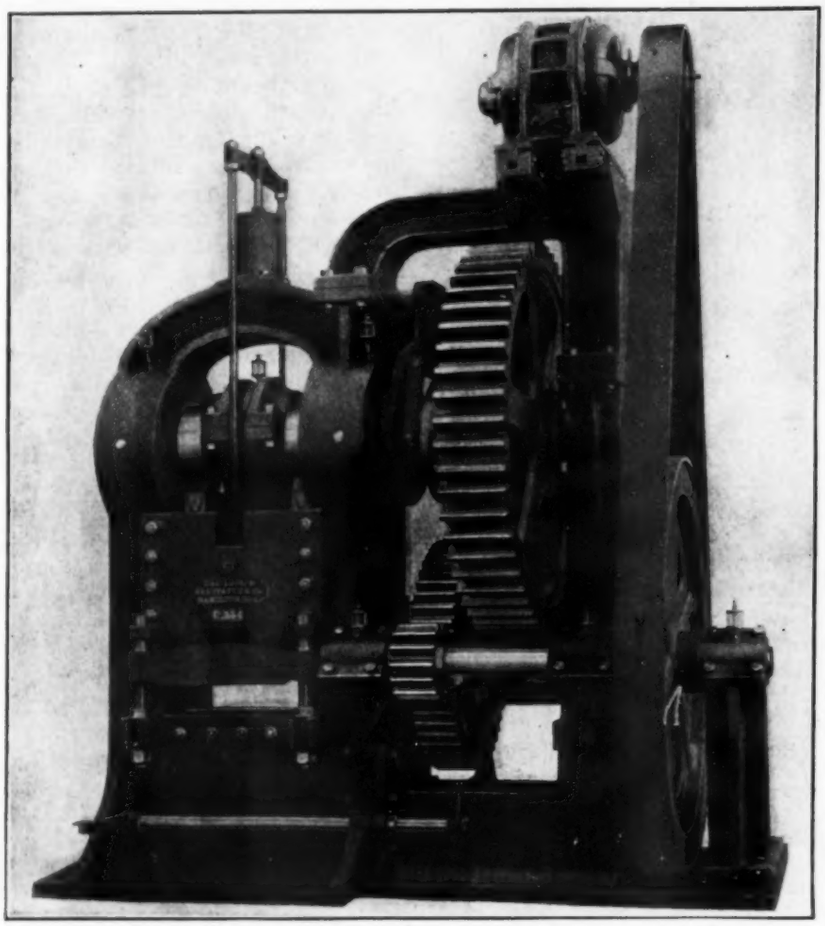
Three levers are used to obtain the forty-two feeds and three other levers to obtain the twelve speeds. A lever is also provided for reversing the feed, as well as one for changing the feed from the rod to the screw. The arrangement of the levers on the head can be seen in the illustration, those levers controlling the drive being on the head and those for the feed being on the front of the bed.

High-carbon heat-treated steel is used for all gears and shafts and bronze bearings are employed throughout. A departure from the construction previously followed by the concern can be noted in the fact that the feed is set in inches per minute regardless of the spindle speed, instead of in thousandths of an inch per revolution as heretofore. The feed mechanism is driven from a constant-speed drive shaft, which arrangement gives forty-two feeds from 0.4 to 22.4 in. per min. travel of the carriage.

Since the combination of the twelve speeds and the forty-two feeds provides a maximum capacity of 504 thread changes, the range of threads that can be cut covers all standard threads and many odd and special threads as well. The lathe is built in sizes from 10 to 30 in. swing. Regarding the general features not herein explained, the machine follows the design and practice of the other lathes made by the concern.

Long & Allstatter Guillotine Bar Shears

A redesigned and improved line of guillotine bar shears is now being marketed by the Long & Allstatter Co., Hamilton, Ohio. The improved machines are adapted to the shearing of square, round or flat bars, and built in a range of sizes for cutting off steel bars from 1½ to 7 in. square.



LONG & ALLSTATTER GUILLOTINE BAR SHEAR

In order to obtain a machine that will be as rugged, compact and free from flexure as possible, the main frame or housing is made from a one-piece casting of box design, the material for the frames of the larger sizes being cast steel and for the smaller machines, a semi-steel mixture. It is said that series of tests on these machines have shown remarkable endurance of the cutting edges of the blades, due in a great measure to the rigid construction maintaining the blades in alignment.

The slide or ram has a long bearing on its guides and the slide bearings are lined with bronze. The weight of the slide is counterbalanced by air, by springs, or by weights that operate below the floor level. The gears are of steel with cut teeth and are placed at the side of the machine in order to give unobstructed access to the cutter. The gear shafts are all mounted in bearings at each side of the gears, so that no gears overhang.

An improved automatic stop for operating the clutch always brings the slide to rest with the blades open, and is provided with a safety locking device so that the clutch will be engaged only when the treadle is completely down. The machine can be stopped after each stroke or can be run continuously, as desired.

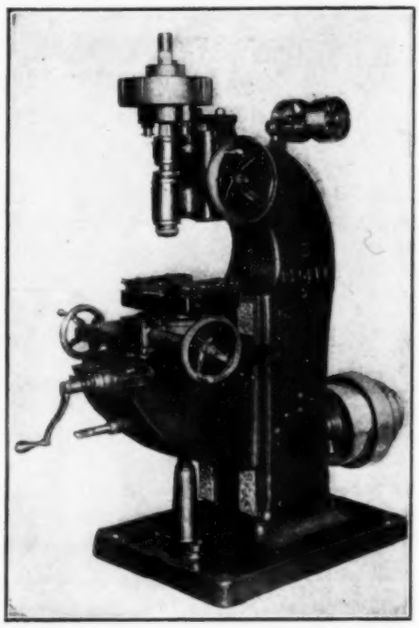
The flywheel is made sufficiently heavy to relieve the motor, or other driving medium, of much of the high peak load at the instant of cutting. The machines are all self-contained, the various parts being assembled on a base to insure proper alignment.

The size H machine is shown in the accompanying illustration, and will cut mild steel up to 5½ in. square or 6 in. round. The stroke is 6½ in., the length of blade is 26 in., and the width between housings is 30 in. A 40-hp. motor is required to drive the machine at 16 strokes per min., and the floor space required is 142 x 109 in. Six other sizes of the machine are built.

Becker No. 4 Die-Sinking Machine

A modification of the standard Becker No. 4-B milling machine adapting it especially to the needs of the die-sinker, has been placed on the market by the Reed-Prentice Co., Worcester, Mass.

Instead of the usual milling machine table, this machine is fitted with a special vise mounted permanently upon the upper sliding number and capable of rotation through a complete circle by means of the handwheel, worm and worm-wheel. The capacity of the vise jaws is 9 x 7 inches, and a movement of 14 in. to and from the face of the column and at a right angle thereto is available.



BECKER NO. 4 DIE-SINKING MACHINE

The knee may be elevated through a distance of 19 in., and this is supplemented by a vertical movement of the spindle head through a range of 5 inches. No power feeds are applied.

The spindle is fitted with internal reduction gears and is driven by a 2¾-in. belt running over idlers from the horizontal drive shaft at the rear of the column. A 3-step cone

takes the belt from the countershaft and with the reduction gearing makes available 12 spindle speeds, ranging from 11½ to 680 revolutions per minute.

The main bearing is of bronze, having a diameter of 2¼ in. and a length of 6¼ inches. There is a through hole 1⅜ in. in diam. for draw back and knockout rods. A No. 10 B&S taper hole provides for the reception of shank mills and the spindle nose is threaded for attaching chucks or cutters that are screwed into place.

The machine occupies a floor space of 59x60 in. and weighs approximately 2,440 pounds.

Cleveland Automatic Hub Machine

A recent addition to the line of automatic machinery manufactured by the Cleveland Automatic Machine Co., Cleveland, Ohio, consists of an automatic lathe for the manufacture of automobile wheel hubs. This machine is similar in action to the automatic piston machine manufactured by this company, and Fig. 1 gives a general view of the essential features.

The hub is mounted on an arbor as shown in Fig. 2, one end of which is chucked in a hand-operated air chucking mechanism. The other end of the arbor is supported by a roller bearing in the tool stock spindle and is driven by the boss on the spindle hood, which engages the lug on the arbor.

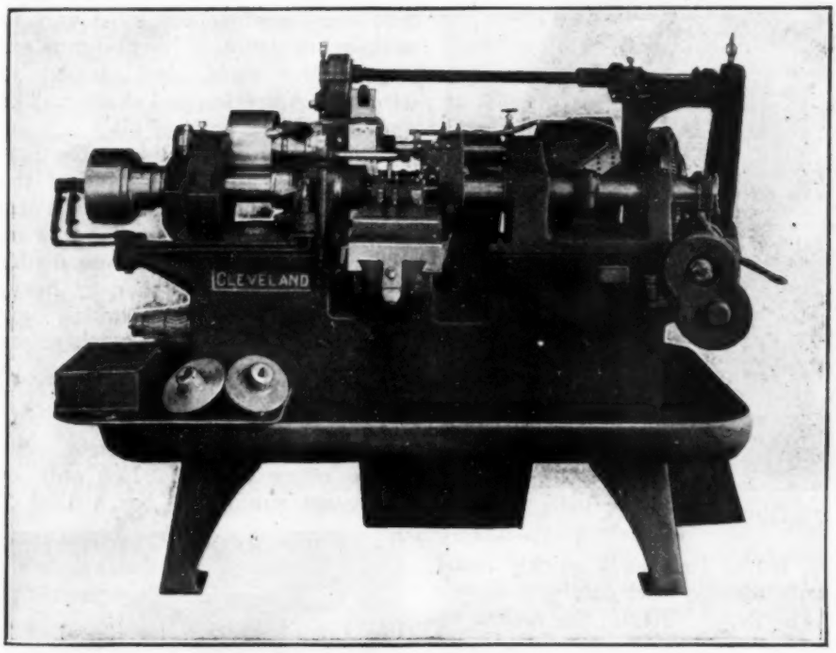


FIG. 1—CLEVELAND AUTOMATIC HUB MACHINE

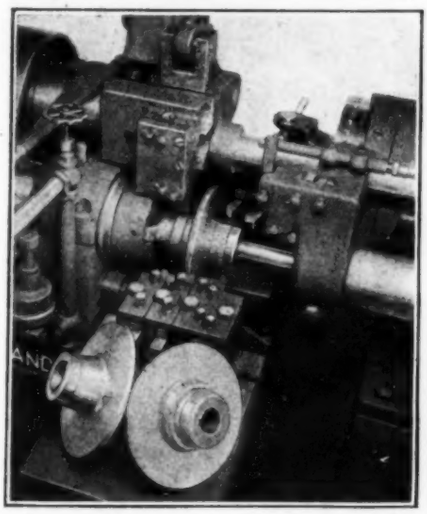


FIG. 2—TOOL SET-UP ON CLEVELAND HUB MACHINE

The overhanging arm mounted on the tool stock spindle and rigidly supported in the rear, carries three cutters, one of which turns the flange diameter, while the other two rough turn the small diameter and face one end.

The overhead turning attachment which is mounted securely on the spindle head and operated longitudinally by a cam on the camshaft, carries two cutters for rough turning the other small end. Three cutters in blocks mounted on the rear cross-slide rough face the flange and rough form and face one end.

Both ends are finish formed and the finish facing of the front of the flange is done by four cutters which are mounted on the front cross-slide. A hub is produced at each cycle of the camshaft.

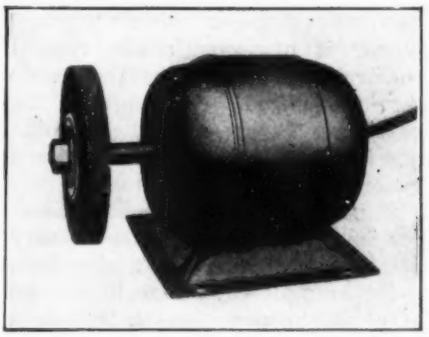
The machine is driven from a single pulley with a clutch which automatically stops the machine as each hub is completed. The machine is arranged for either belt or motor drive and the lever for starting the machine, as well as the air control lever, is within easy reach of the operator.

It is stated that three machines can be operated at once by one man, and that 12 hubs can be produced per hr. by each machine from forgings.

Atta Bench Tool Grinder

The Atta Tool Co., 172 Union St., Worcester, Mass., has recently brought out a small bench tool grinder that should command attention because of its unique construction, its lightness and cheapness. It is intended for use in homes, garages or other places where a grinding wheel is occasionally needed to sharpen small drills, chisels and similar tools.

The device is made almost entirely of sheet metal stampings; the rotor shaft being the only machined part. The base is a single stamping and the body is composed of two flanged cups, held together and to the base by the central band. But one machine screw is used in the entire construction.



ATTA BENCH TOOL GRINDER

The motor is designed for 110-volt alternating current only, and may be attached to any convenient a.c. lamp socket. The device swings a 4x½-in. wheel.

Gray Switch Planer

For heavy planing work in the manufacture of railway switches, the G. A. Gray Co., Gest & Depot Sts., Cincinnati, Ohio, has just placed on the market a special design of switch planer. The heavy switches now used in railway work are generally made from open-hearth manganese steel rails which have a high carbon content, and this

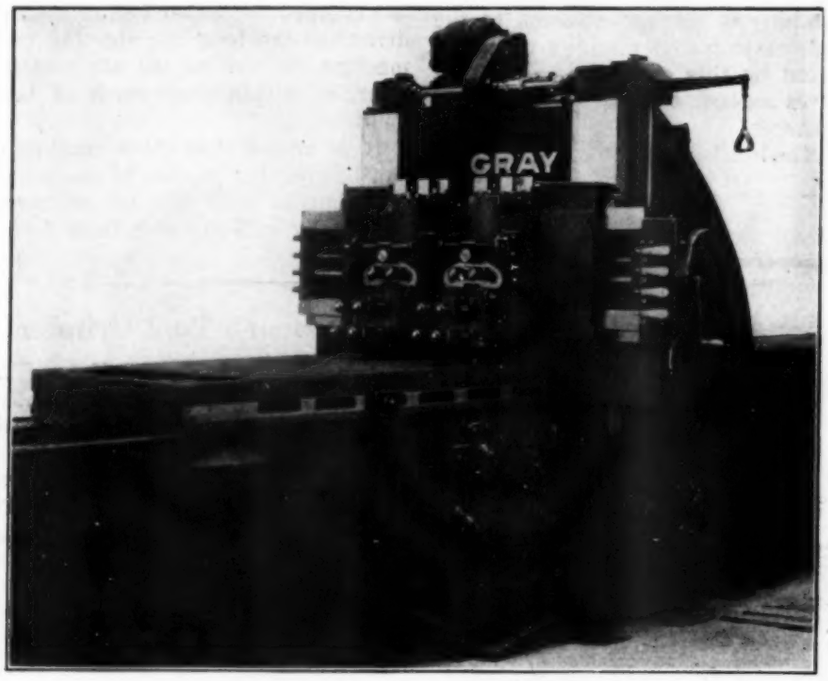


FIG. 1—GRAY SWITCH PLANER

planer is of exceptionally rugged construction to perform the heavy service required. The weight of the parts and the power of the machine are indicated in Fig. 1, which is a general view.

The housings and the rail surfaces are much larger than in the ordinary planer, and the bed has also been made very deep so that it will be rigid at the point where the gears are supported and where the heavy strain of cutting must be sustained.

Switch planing work is practically confined to two major operations. First, feeding the two heads toward each other in order to take simultaneous cuts on the sides of two rail heads; second, the operation shown in Fig. 2, in which both tools feed directly down into the flange of the rail, cutting off the flange.

In the first-mentioned case, the operator depresses the highest and the lowest clutch lever shown at the right-hand end of the rail, thereby throwing both traverse and manual feed levers into engagement with the cross-feed screws. Then by turning a single crank at the end of the rail, the desired amount of feed is easily provided, the heads moving toward each other. When the cut has been completed a single pull on the traverse lever, which is directly underneath and near the manual feed lever, starts the traverse motor and moves the heads quickly apart, ready for the next cut.

For flange cutting, the second operation mentioned, the second and third levers are depressed, the others being released by touching buttons provided for that purpose. The manual feed lever will then give a feed of both tools down toward the work, and a single motion of the traverse lever brings both slides quickly back to the starting position. It will be noted that to change from the first operation to the second requires little time and no great effort on the part of the operator who, with only two control levers to manipulate, is able to keep his eyes on the tools and the work. If desired, either head can be independently controlled.

The heads are heavy and rigid and the tool apron is provided with an abutment or shoulder at the lower end, so that the heavy upthrust of the tool is not borne on the pin upon which the apron swings, but by the bearing of this shoulder against the tool box. Twin purpose taper gibs are provided for slides and heads, a turn of the handle in one direction positively adjusting the gib to the operating position, and a turn in the other direction locking the two parts securely together throughout the length of the gib.

The table driving gears are of unusual size and of steel throughout, the pinions being cut from steel forgings. From the drive shaft pinions to the bull pinion the gearing is of the balanced helical type. At the first reduction, for instance, a driven gear is mounted on each end of the pinion hub, thus balancing the torsional effect. The shafts are pinned to the gears and rotate with them and are therefore subjected only to a shearing strain. This design is exceptionally rigid and tends to eliminate vibration and chatter. The gears run in a bath of oil.

The bed is cast solid on the bottom to form an oil tank and at the same time tie the side walls together. The bed has two walls on each side of the gears, these double walls being tied together by heavy webs. The bearings which are mounted in the walls are therefore rigidly supported, and the bed is stiffened between the housings and throughout the gear space.

The planer has a complete automatic oiling system. Not only do the gears run in oil, but a flood of

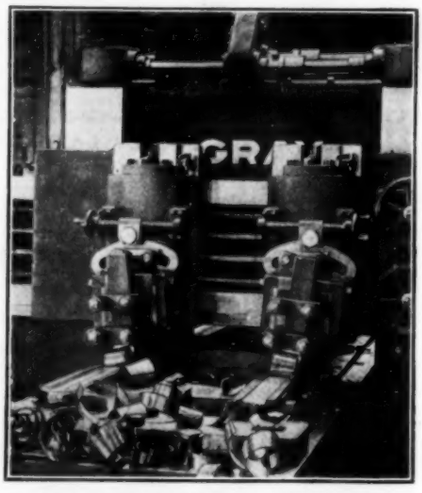


FIG. 2—GRAY SWITCH PLANER IN OPERATION

oil is also pumped to the ways and to the drive shaft bearings. At each end of the bed a strainer plate and a settling basin are provided, from which the oil returns to the central reservoir. As an additional safety feature, the oil is passed through

another strainer and a filter before being again pumped to the ways and bearings. Both the filter and the pump are mounted on the outside of the planer for easy inspection. The oil pump is coupled direct to the drive shaft.

While the position of the rail is not often changed in switch shops, it may be readily raised and lowered by pulling down the stirrup at the operator's end of the rail and pushing the traverse lever into the running position. The rail is clamped on the outside and inside edges of each housing.

It is stated that one of these planers in a test run cut through the flanges of two 100-lb. R.B. rails, of 70-point carbon, open-hearth steel, in five strokes. The width of the cut varied from zero to 3 in., the feed was about ¼ in., and the cutting speed was 25 ft. per min. The range of cutting speeds of the planer is from 25 to 50 ft. per minute.

Ramsey Silent Chain

A type of silent chain, which is simple in design and at the same time possesses features which should insure satisfactory operation, is now being marketed by the Ramsey Chain Co., Inc., 1031 Broadway, Albany, N. Y. A section of the chain is shown in the accompanying illustration, one outside link having been removed and the ends of the pins at the joint having been ground off to show the profile.

The joint is the feature of the chain and, from its action under operating conditions is called a compensating joint. The ground joint at the left shows the pins in their relative positions when the chain is straight, and the adjacent joint shows their relation when the chain is flexed around a sprocket of comparatively small diameter. A chain of appreciable pitch always receives a slight accelerative impulse as it goes into mesh with a sprocket and this acceleration is compensated in this chain by an increase in the pitch of the link, produced by the joint at the meshing point. The position of the pins as the chain meshes with the sprocket will be somewhere between the two positions shown, and in this position the profile of the pins allows them to move toward each other, thus decreasing the effective pin diameter and increasing the pitch of the link to compensate for the accelerative impulse. This feature of the chain tends to smooth running with all its attendant advantages.

It will be noted that the profile of all the pins is the same, producing a symmetrical joint and allowing the chain to run in either direction with equal facility and efficiency. The individual links are also symmetrical and the simple contour of the holes for the pins facilitates accurate construction of the links. Since the relative motion of the pins is rolling there is no tendency of the faces to slip and groove as wear occurs, a condition which is also helped by the small angle between the pin faces throughout their action.

One pin of each pair is carried through the outside links in which it is a drive fit, and is spun over after assembly. This method holds the pin in proper relation with the chain at all times.

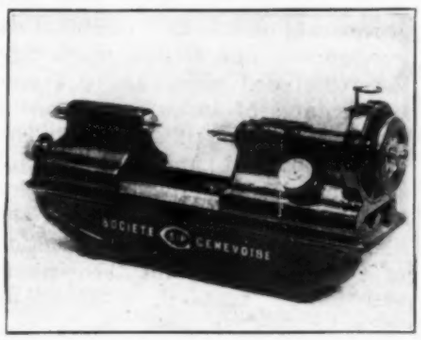
The accuracy and precision of this chain are said to be remarkable, a result of the simple design and the use of Johansson gage blocks for the production and inspection of manufacturing tools and gages. The comparatively large cross-section of the pins also tends to produce a chain with ample strength for the service required. The chain is now made in standard pitches from ⅜ to 1 in. inclusive.

RAMSEY SILENT CHAIN

Societé Genevoise Bench Micrometer

The R. Y. Ferner Co., 1410 H. St., N.W., Washington, D. C., has recently placed on the market a line of precision bench micrometers manufactured by the Societé Genevoise d'Instruments de Physique, Geneva, Switzerland. These instruments are said to be accurate to within 0.00005 inch.

A bed with accurate ways forms the base of the machine, upon which the headstock containing the micrometer screw may be set at any desired point. The zero anvil consists of one of the test comparator tubes manufactured by this company, mounted in a tailstock in which the comparator tube may be adjusted by a slow motion device to obtain the final adjustment before



SOCIETÉ GENEVOISE BENCH MICROMETER

taking readings. Only an occasional setting of the headstock is necessary as the micrometer screw has a range of 2 inches. The contact spindle does not revolve.

The micrometer head is protected by a heavy shield which covers all the graduations except those opposite the vernier index. Each division of the head represents 1/20,000 in., and the vernier permits readings to 0.000005 in. An adjustable reading glass is provided, and the head is rotated by means of a fiber handle to prevent conduction of heat from the user's hand.

The test comparator tube also serves as a pressure indicator, its contact plunger being pressed against a helical spring until a pointer reaches the zero of a scale graduated to thousandths of a millimeter. A knife-edge amplifying mechanism actuates the pointer.

These instruments are furnished in three sizes. The smallest has a capacity from 0 to 4 in., the second from 0 to 8 in., and the largest from 0 to 16 in. End measuring rods are

furnished so that the headstock can be set to measure any distance in the range of the instrument. The headstock is clamped in position by the large knurled thumbnut shown in the illustration, and a window at the top of the headstock is provided through which the multiple of turns of the micrometer head may be determined.

These micrometers are supplied standardized for 62 or 68 deg. F., as desired, for the inch units, and can also be furnished with metric graduations, in which case readings can be made to 0.0001 mm. by means of the vernier.

Buffalo Improved Combination Woodworker

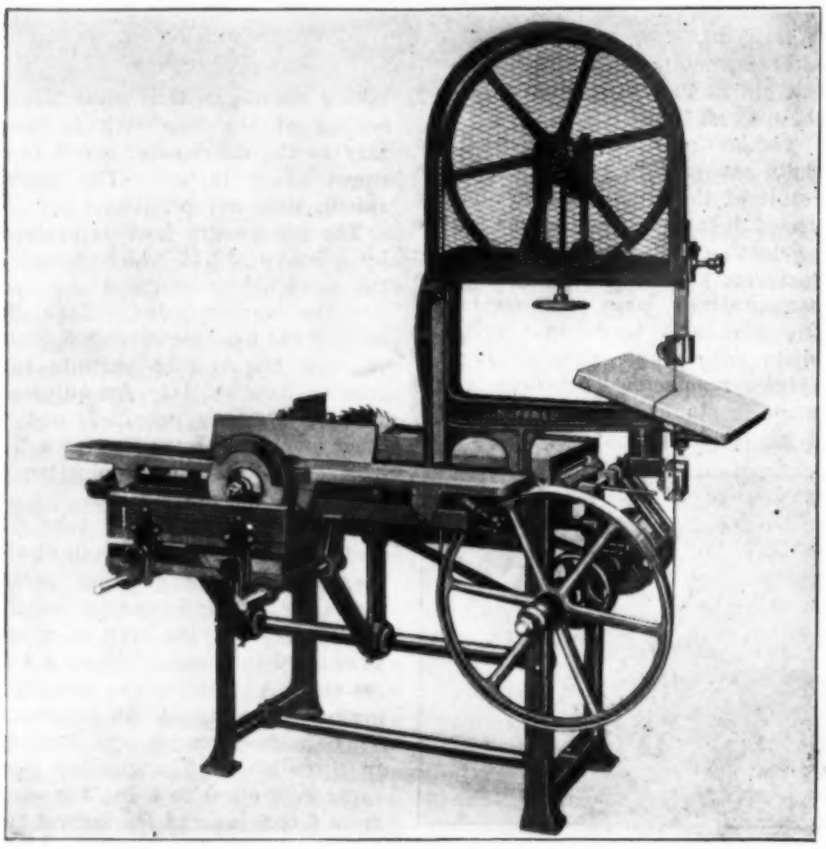
The Buffalo Forge Co., Buffalo, N. Y., has recently made some improvements on its No. 2 combination woodworker, and is now marketing the redesigned machine, the essential features of which are shown in the accompanying illustration. The more important improvements include provision for quicker, simpler and more accurate adjustment of the planer guide, and the introduction of a positive drive for the rip-saw and jointer mandrel, obtained by means of a raw-hide pinion and gear.

The new planer guide arrangement consists of a slot in which the planer guide is moved backward and forward. The guide is locked in position by means of one thumb-nut, and can also be set at any angle.

The use of the pinion and gear drive to the jointer and circular saw shaft gives smoother running than the former belt drive and eliminates belt slippage. The ratio of the gears is approximately 2 to 1.

The machine combines in one assembly a circular saw, a band saw and a jointer. Jaw clutches are arranged in the drive so that the different parts of the machine may be run independently. The saw and jointer tables are adjustable. Arrangements are made so that an emery wheel may be mounted on the outer end of the jointer shaft, and an 18-in. disk sander may be attached to the lower bandsaw shaft.

The bandsaw has a cast-iron tilting table which may be locked in any desired position. The drive shaft should run at 700 r.p.m., and the power required is about 2 hp. for the bandsaw and up to 3 hp. for the ripsaw depending on the working conditions.

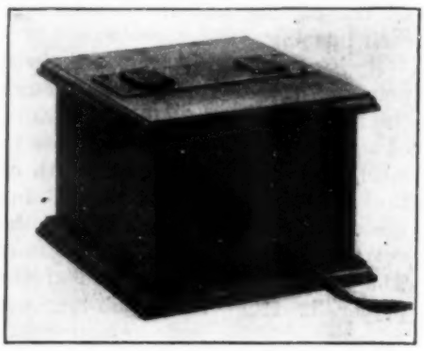


BUFFALO IMPROVED COMBINATION WOODWORKER

Thorn Demagnetizer

A. J. Littlejohn, 508 East Genessee St., Syracuse, N. Y., is now distributing a portable demagetizer, designed for moderate sized machine shops and for tool rooms in which magnetic chucks are used, and manufactured by the Thorn Machine Tool Works, Syracuse, N. Y.

The instrument operates direct from an ordinary electric light socket, thereby eliminating all installation cost, is easily portable and occupies but small space. The effectiveness of the device is said to compare favorably with higher priced and more complicated equipment.



THORN DEMAGNETIZER

The demagnetizer is built for 110- and 220-volt alternating current, and it is claimed that the maintenance and operating costs are remarkably low.

Many Autos Exported Last Year

Exports of automobiles and parts from the United States stand first among all manufactured products shipped from this country, says M. H. Hoepli, Acting Chief of the Automotive Division of the Department of Commerce. They are now exceeded only by five other commodities, none of which is classed as "manufactures."

The government figures for the foreign trade of the United States during the fiscal year 1922-1923 show that "Automobiles and Parts" occupy sixth place among all the commodities exported, being exceeded only by the following: cotton, unmanufactured; mineral oils, refined; wheat, tobacco leaf, and coal. In the export table they are considerably in advance of the other leading manufactured products, including cotton cloth, which holds ninth place; iron and steel, which is sixteenth; and agricultural machinery, which is nineteenth.

The total value of the automobiles and parts exported in 1922-1923 was $132,035,000, representing an increase of 467 per cent over the pre-war average for 1910-1914, and an increase of 72 per cent over 1921-1922.

News Section

Founders Discuss Problems of Labor at Annual Convention

Giving particular attention to various phases of the labor problem with the idea of improving the relationship and furthering co-operation between employers and employees the National Founders' Association held its twenty-seventh annual convention on Nov. 21 and 22 at the Hotel Astor, New York City. The opening session was devoted chiefly to reports of officers and committees, although in addition Magnus W. Alexander, managing director, National Industrial Conference Board, told of conditions in Europe as he had recently observed them.

The address of the president, William H. Barr, covered a broad field. With reference to the relationship between employers and employees he made the following statement: "During a year of substantial prosperity and ready employment our relationship with our employees has been comparatively harmonious and singularly free from evidences of discord so often expressed by dissatisfied workers in other trades. This is due in part to a better appreciation of the opportunities to be found in the sound policy of the "open shop," or American plan of operation. I believe that a definite factor which has favorably influenced this friendly relationship is the development of a better understanding of the mutual problems involved. Calm analysis, equitable dealing, and capable foremen to interpret the views of the management, have eliminated many causes for dissatisfaction in plant personnel relations."

In the afternoon session Dr. H. H. Myers of the Malleable Brass Co., Mansfield, Ohio, spoke on personnel work and showed the need and the value of it. Horace A. Frommelt of the Falk Corp., Milwaukee, told about an apprentice training system that had proved successful. Fred R. Marvin, of the *New York Commercial*, spoke of the evil effect of radical literature, his subject being "Bootlegging Mind Poison." The value of educational motion pictures was the subject of Dr. Paul Smith, of the American Motion Picture Corp., New York City. At the convention dinner an address was delivered by the Honorable J. Adam Bede, of Minneapolis. Stereopticon views showing the opinions of prominent men in favor of the open-shop principle were shown on the screen.

The Thursday morning session was devoted to two subjects. Enrique Touceda, consulting engineer, American Malleable Castings Association, gave a talk on grey-iron foundry practice and the remedy for some of the troubles encountered. The "Progress of the Open Shop" was the subject of Noel Sargent of the National Association of Manufacturers.

The present staff of officers was re-elected, as follows: President, Wm. H. Barr, the Lumen Bearing Co., Buffalo; vice-president, Charles L. Taylor, the Taylor & Fenn Co., Hartford, Conn.; commissioner, A. E. McClintock, Chicago; and secretary, J. M. Taylor, Chicago.

Immigration Problems Will Be Discussed

On Dec. 13 and 14 at the Hotel Astor, New York City there will be held a conference known as the National Immigration Conference which will be under the auspices of the National Industrial Conference Board. At that time six questions touching upon the immigration laws and the remedy of the situation as it now stands will be discussed. Preceding the opening of the discussion a concise presentation of the present immigration problem will be set forth.

The tabulation of questions ready for discussion is as follows: Shall the Per Centum Limit Act which expires by limitation on June 30, 1924, be retained by extending the period of operation?, Shall the Per Centum Limit Act be retained with amendments in respect to administrative features?, Shall the Per Centum Limit Act be retained with amendments in respect to present restriction?, Shall the Per Centum Limit Act be superseded by new legislation and if so, by what kind?, Shall special legislation be enacted to assure better selection, distribution and assimilation of alien immigrants?, and Shall an Investigatory Commission be appointed by the President under Congressional resolution to inquire into and report within a limited time?

Car Loading Remains at Record Rate

Car loadings for the week ended Nov. 10 totaled 1,037,067, the largest for the corresponding week in any year, an increase of 291 cars over the preceding week and of 91,881 cars over the same week of last year. This was the twenty-first week in which car loadings totaled more than a million, and in four other weeks the loadings were at the rate of a million, but did not reach that figure on account of holidays.

Loadings of all classes of revenue freight in the Eastern district showed an increase of 4.4 per cent over the same week last year, while the Southern district reported an increase of 4.9 per cent and the Western district 19 per cent. In the forty-five weeks since the first of the year the car loadings throughout the United States have totaled 43,691,728 cars, against 37,144,-181 last year.

But while a slight gain was made in the total loadings, as compared with last week, merchandise and miscellaneous car loadings, generally taken as a criterion of manufacturing conditions, showed a decrease of 20,286 to 613,961 cars, a figure still 56,891 over the same week of last year. A large part of the decline in comparison with last week, it is pointed out, is due to the seasonal reduction in merchandise loadings.

Vocational Education for Workers

Adult wage earners, who wish to receive technical training which will help them in their occupations, may now secure such training from the public school, announces the Federal Board for Vocational Education.

Under the Federal and State Vocational Education Acts, funds are available to assist the public schools in each community to set up adult evening classes for wage earners. To receive such instruction, it is necessary that a group of workers, employed in a common industry, take the initiative by organizing themselves into a class. Next, they should present themselves to the local school authorities and request an instructor. The local school board is empowered to provide an instructor and a class room, to the applicants. Thereupon, the class begins its sessions on a regular nightly schedule.

The only restriction that the public schools lay upon such adult extension work is that all members of the class be workers, actually employed in the trades for which they desire training. Thus the mistake of training workers for trades in which they can not get employment is avoided.

Factory Equipment at Power Show

Shortage of common labor has driven the manufacturers of the country to an intensive study of the possible economies of material handling equipment in industry. The addition of material handling equipment to the National Exposition of Power and Mechanical Engineering is timely as it furnishes a remarkable opportunity for executives and engineers in industry to study the latest development in this art. The exposition is to be held in the Grand Central Palace, New York, from Dec. 3 to Dec. 8.

The equipment to be exhibited will include conveyors of all kinds, fireless steam locomotives, industrial trucks, elevators, hoists and large scales. Many novelties are on the list and interested engineers will have an excellent opportunity to study each type, select the one most suitable for their particular problem and secure the cost data necessary for the decision.

Philadelphia Business Reported As Satisfactory

General business conditions in the Philadelphia district were reported satisfactory this week with seasonal lulls in some lines. A general feeling among iron and steel men that prices of these basic commodities might soon be reduced was one of the bright spots in the outlook, and this was supported by reports that automobile production is keeping up.

Philadelphia manufacturers of auto bodies are busier now than in several years. Manufacture of auto trucks was reported to be satisfactory.

Business men have reports that steel mills are ready to reduce prices if a reduction would stimulate business. Whether a stimulation would come with a price reduction was one of the subjects being studied.

Activity in automobile production has not benefited the machine tool industry. Most of the auto factories are well tooled up and little or no changes in patterns are being made. Tool manufacturing in Philadelphia is slow and there is nothing in the inquiries received or in the general business outlook to indicate an early change for the better.

Announcement by the Pennsylvania Railroad Co. of a sharp curtailment in its shop personnel throughout the entire system affecting a total of 60,000 men in the four regions, was not good news for the tool manufacturers. Starting Nov. 22, shops in which general repair work was done were shut down until Dec. 3, the company announced, and unofficially it was stated when they reopen it will be with a curtailed personnel.

In Philadelphia and Wilmington, Del., about 3,000 men are affected. The road's statement on the shop closure said:

"In November there is normally seasonal reduction in railroad traffic earnings. The Pennsylvania R.R., in compliance with the American Railway Association, has placed its property in good condition for the Winter, and has a surplus of cars and locomotives available for service. The usual adjustment in working forces is accordingly taking place."

New York Market Remains Steady

Business during the month of November in the New York district has been steady but not as good as was anticipated nor as good as the business done during either of the preceding two months. This does not mean that business is bad, but it is in the peculiar state characterized by dealers as "waiting." Inquiries from general industrials and lists from railroads are being figured on and every effort at the command of the salesmen is being put forth to close contracts, but the success usually attendant upon such endeavors is not forthcoming. Many of the dealers are of the opinion that this waiting attitude will last until the first of the new year, but this will not be so unusual a condition as the month of December is traditionally quiet.

Railroads Buying

Railroad buying is reported from some sections and the New York Central R.R. is beginning to close on a long list of tools for which it inquired several weeks ago. The Delaware, Lackawanna & Western R.R. is also ready to buy before the first of the year if rumors are correct. Whereas the railroads and the automobile shops were the purchasers during the Summer and last Spring, now the general industrials are purchasing more freely than before, and the other two sources are not in the market to the extent that was expected.

One is impressed with the extremely optimistic views of the coming year that are manifested by machine tool dealers in New York City. It is pointed out that there is nothing on the horizon to check the prosperity that seems sure to come. The slight influence for curtailment of buying that is usually accredited to the presidential election year is discounted and the Mellon tax reduction plan is hailed with delight by these men who see a freer money market and better invested capital. The automotive industry and the railroads should be as good customers in 1924 as in 1923, it is pointed out, and the general industrials should be in the market to a much greater extent than during the past year. Added to this is the anticipated Japanese business which will not be coming before next Spring, but which will continue steadily once it has started.

Cleveland Trade at Even Pace

While the larger industries, such as the automotive trade, the railways and the like, have continued their inquiry for machinery and tools that will be needed in their respective plants to turn out new equipment and product for 1924, to a certain extent this prospective new business has slowed down for the present, and the expected action probably will not develop in orders until nearer the end of the year.

This is the opinion of leading machine manufacturers and distributors in the Cleveland district, following some pressure on their part to bring this business to a close.

On the other hand immediate business, though smaller in character, will fill in the gap. This likewise is the opinion of leading authorities on business here with the advent of plans of not a few independent interests for enlargement of their operations here.

Some of these improvements may be enumerated here. They include additions or new manufacturing buildings for such firms as the Ferro Machine & Foundry Co., the Henry Furnace & Foundry Co., the P. A. Geier Co., vacuum cleaner and vibrator manufacturer; the White Motor Co., and the Cleveland Cutter & Reamer Co. These improvements alone involve an expenditure for buildings of about $400,000, and a corresponding outlay for equipment may be expected, though these plans have not yet been made public.

Probably the most encouraging feature to break in the last fortnight is the announcement of the formation of the Goodyear-Zeppelin Co. at Akron. This is believed to mean the establishment of Cleveland as a center for Zeppelin parts manufacture. Unofficially it is stated that the Aluminum Co. of America may be retained to manufacture frames for the new type of aircraft, since this firm has previously made similar parts for American type dirigibles. This is but one phase of an industry that may develop to large proportions. The Akron interests have acquired the American rights to the German patents and eventually hope to promote the establishment of regular aircraft routes in which the new type of ship will be used.

Indiana Trade Better Than Last Year

Little change is to be seen in the general demand for machine tool and machinery trade in Indianapolis. In some lines business has shown a tendency to slump, while in others there is sufficient expansion to keep total volume well up to normal. In fact, after a somewhat poor start, dealers believe the late Fall and Winter will be better than last year.

Due to some reverses in automotive circles during the last two weeks, involving a receivership petition for both the Haynes and Apperson companies, there is a note of caution in the entire automotive trade. Demand for special machinery and tools has fallen off and there is no disposition to expand production. Business in closed cars is much better than last year, according to orders being received from dealers, but there is an undercurrent of uncertainty that is holding up expansion projects.

Fred A. Gardner, treasurer of E. C. Atkins & Co., makers of saw mill machinery and special woodworking tools, says business is exceeding all ideas of members of the company. He says big orders are being received from the Southern pine and hardwood districts that indicate a confidence on the part of the trade for next year. Some big orders have been filled for West coast mills during the last few weeks and there seems to be no end to demand for these machines.

Two makers of brick manufacturing machinery here say the outlook is encouraging. They have made many sales during the last month to plants in Indiana and Illinois and others to points more distant. They say indications point to active demand for their machinery during the entire Winter. There will be a slight lull in manufacture of brick during the mid-winter season, they say, and this will enable the plants to make some much needed additions and replacements.

Dealers in used machinery report a slight decrease in demand now, but say a volume of inquiries leads to the belief that business will pick up during the next month.

Production and Sales Are Improved in Cincinnati

Business among the Cincinnati machine tool houses continues at about the same pace that has been maintained during the past month. Production is going along at a fair rate with many manufacturers reporting that their orders have increased slightly within the last two weeks. Inquiries are also more numerous and are lending encouragement to the sales departments of the various plants. The buying being done by railroads is increasing and several roads have had inquiries out regarding machine tools lately. It is expected that some of this business will come to the Cincinnati market. The buying by the automotive industry has held up to a fair level, according to the statements of several local manufacturers. It is not anticipated, however, that there will be much of an improvement in the Cincinnati machine tool business before the opening weeks of 1924. Observers believe that the present rate of production will be adhered to during the rest of November, while December will see a slight falling off in activities although some manufacturers state that they expect business to be good during the rest of the year.

Several of the largest factories making lathes and milling machines have held up to a satisfactory production schedule during the Fall season. It has been necessary for the sales department to expend strenuous efforts to secure orders, but those plants which have been on the job every minute have succeeded in holding their output up to a fair level considering the decreased buying which has been done the past two months.

The dealers in used machinery say that their sales have shown increases during November and the present outlook is for good business the rest of this year. The sale of small tools has also been good and manufacturers are encouraged with the trend of business in this line.

Planers have been in fair demand with inquiries rather numerous, but purchases are being made cautiously. Upright and radial drills have had a quiet market and demand has not been heavy. Electrical tools have been selling in fair quantities with the outlook good for future business. Production of automobile accessories by local houses is maintaining a satisfactory pace with orders booked ahead for the next few weeks. Wood working machinery plants are busy with their departments running at capacity.

It is expected that there will be some foreign business done by Cincinnati houses within a short time. Negotiations have been entered into with Japanese concerns and several large orders from the Orient are expected to be placed in this market within the next month.

In the metal trades there has been slight improvement in recent weeks and sales are slightly in advance of 1922 for this period. More inquiries are being received concerning pig iron, though actual business as a result is negligible and very little tonnage is being placed for first quarter delivery. Even in view of the fact that consumers' stocks are low they continue to buy cautiously and prices are rather unstable.

The labor situation in this city is very good. Government reports show that employment gained here during October and also the early part of November.

South Gains: Future Prospects Good

Machine tool conditions in the Southeast have experienced comparatively little change during the past two weeks, though the various Atlanta distributors are feeling a little better over the outlook than they have for some time. If anything, sales have improved a little as compared with the first ten days of November, and it is practically certain that the month will be quite a bit better than November, 1922. Regarded as a whole, machine tool sales at this time are about 10 to 12 per cent better than during the same period last year, though with the individual distributors conditions show a varying tendency, in some instances showing no gain over last year. Conditions are expected to remain about the same in December.

Fewer Inquiries

Inquiries appear to be rather slower than usual so far as the number received is concerned, yet are developing more business, with the result that sales will be slightly better this month than they were in October. There is not so much tendency on the part of buyers to shop around for the best prices as was the case in the late Summer.

Conditions are very spotty as regards the various industries of the district doing the machine tool buying at this time. While textile plants were buying on a good basis a month or so ago, there has been a marked falling off the past two weeks. This is due to rapidly increasing cotton prices, which is sending cotton manufactured goods upward and retarding the mill demand considerably. Therefore, textile plants are buying little or no machinery to speak of until the situation stabilizes, which will probably not be before the early part of the year.

Railroad Sales Improving

Inquiries have recently been received from the railroads of the district, and sales in this field are improving steadily. They are, in fact, better than they have been in some time, with the outlook for the first quarter of the coming year very good. The principal machine tool demand right now is from the railroads, those in the South having spent large sums the past two or three months in shop equipment, and planning still further expenditures the next few months.

Smaller shops still are reported as inactive buyers, but improvement in this field seems certain after the first of the year. Save for the past month or five weeks the smaller shops have been among the principal machine tool buyers in the South all this year.

The outlook for the first quarter of the year is as good as it has ever been in the history of the South, and machine tool distributors are expecting to share in the prosperity that is certain.

Chicago Market Gets Many Orders

Machine tool dealers in the Chicago district have been anticipating a renewal of buying by industrials for several months, but were not encouraged by actual inquiries of consequence until the A. O. Smith Corp., Milwaukee, Wis., issued a list of 48 items including 10 engine lathes ranging from 12-in. x 6-ft. to 48-in. x 24-ft.; five milling machines; five planers; seven grinding machines; four horizontal boring mills; radial drills; slotters; shapers and drilling machines. Several other industrial inquiries are expected to be issued in the near future and would indicate a tendency of the industrial market to improve. Additional railroad inquiries will probably be issued soon for 1924 purchases. Dealers are not expecting another boom, but look forward to better business. The Delaware, Lackawanna & Western R.R. will soon enter the market for a list of machines. The New York Central R.R. is inquiring for about 20 machine tools including various sizes of lathes, mostly small ones, and three or four axle lathes. Also a 2-in. bolt cutter, a triple head bolt cutter, two motor-driven bolt threaders, a No. 5 universal milling machine, a 36x36-in. milling machine and a 30x120-in. planer. The Denver & Rio Grand Western R.R. has ordered a 90-in. wheel quartering machine. The Pennsylvania R.R. has placed an order with the Case Crane & Engineering Co., Columbus, Ohio, for a 5-ton 43-ft. span overhead traveling crane. The South Manchuria R.R. has placed an order with the Whiting Corp. for a 200-ton locomotive hoist. The Sante Fe R.R. will spend about $900,000 for machinery and tools in connection with extension of its shops at San Bernardino, Cal. The Illinois Central R.R. plans for an addition to its shops at Evansville, Ind., which will include the purchase of considerable machine shop equipment.

Car builders received inquiries during the week for 1,500 cars and steel companies report that 10,000 cars will be placed in the next week or ten days. Demand for structural steel is active. Tank buying is active.

Solves Labor Problem by Housing Idea

Within a few weeks 300 new homes for steel plant workers which are being built south of Smoke's Creek, near the Lackawanna plant of the Bethlehem Steel Corp., Buffalo, by the Bethlehem company, will be completed. This improvement is the first part of the plan which was mapped out by Timothy Burns, general manager of the Bethlehem Steel Corp. last January to provide living facilities in the vicinity of the Lackawanna plant to accommodate thousands of the workers and thereby make it easier to find men and decrease the labor turnover of the big steel mill. It is also expected that the company thereby will be able to obtain a better class of labor than in the past.

Taking Inventory in Detroit Plants

With just six weeks of the year 1923 left, the motor industry is getting ready to foot up its assets, preparatory to the opening of an even bigger year.

Practically every Detroit automobile factory will take inventory between now and the first of the year. Some are in the midst of their inventories now. The larger firms will devote two weeks to the work, while smaller companies are planning to do it in much less time.

This seasonal work is having its effect upon the machine tool industry in Detroit While there is necessarily a decline in the volume of business during the inventory season, leaders in machine tool plants agree that Detroit is experiencing "as good a business as can be expected."

They point to the absence of a normal year during the past eight or nine as giving any basis for contrast or comparison with 1923, but they say that there is every indication that this will be a normal year.

Production marks in the automotive field are likely to lose a little as a result of the yearly inventories, but no fear is entertained that any slump in the industry is near.

Splendid weather has meant much recently in the way of construction. Progress far beyond that anticipated has been made in factory additions.

A probable decline in the machine tool field during the remainder of the year will occur, it is believed, although this may not be as much as anticipated.

Employment figures show a further curtailment, the members of the Employers' Association having 212,528 on their payrolls last week, a decline of 1,297 during the seven-day period from the 213,825 mark of the previous week.

New England Plants Expanding

Plans of manufacturers regarding the Thanksgiving close-down serve as an index to the general condition of business at this time, and based on that, the inference is that the condition is uniformly good. Four large employers, who in the past three or four years closed their works Wednesday nights on the eve of Thanksgiving and keeping them closed until the Monday following, will close this year for the day only. Other manufacturers who will close for three days will take advantage of the opportunity of making needed repairs. Two of these manufacturers indicated that the straws point to a business condition at the end of the year which will make it necessary to have only a short shut down.

New England has been "spotty" lately—some factories working overtime and other factories practically shut down. Next year it is expected conditions will be more even and business steadier.

Another indication of the confidence held by manufacturers of this territory is the amount of building operations just at this time. The Stanley Works, New Britain, Conn., has awarded a contract for two additions, one six stories and the other three stories in height; Landers, Frary & Clark, New Britain, Conn., have awarded a contract for a six story addition; the New Departure Manufacturing Co., Bristol, Conn., will erect a modern forging plant. These operations, all announced within a week, called for half a million dollars in expenditures and are required to meet demands in addition to even very extensive war time additions.

Shop Expansion

A new organization to engage in automatic machine manufacture, is shortly to come into production. Another company in the Connecticut district, manufacturers of typewriters, is adding, by purchase, 55,000 sq.ft. of manufacturing space.

The pendulum is swinging back with a decidedly vigorous movement and in the opinion of shrewd far-seeing manufacturers the slough has been left behind.

Engineers Praised by Charles M. Schwab

American engineers are adding to their already numerous achievements, leadership in "human engineering," the science of imbuing workingmen with "the right spirit and a healthy orientation toward their work," Charles M. Schwab declared recently at a dinner given in his honor by the Engineers Club, Philadelphia.

"In recent years," he said, "the engineers of America have directed their energies not alone toward great mechanical achievements, but toward the promotion of sound and amicable relations with labor.

"The people who labor are not and cannot be treated like dumb, driven cattle. They are above all else human beings, with feelings and sentiment, hopes and aspirations, and the fundamental problem of all industry is to so relate the human elements in the men who do the work, to the machines which they operate, that the men themselves shall first of all be happy and healthy, and that they shall thus be able to operate their machines with good spirit and efficiency."

Apprentices Attend Institute Classes

By an agreement between the Pittsburgh Local, Amalgamated Sheet Metal Workers' International Alliance and the Sheet Metal Contractors' Association of Pittsburgh, apprentices in this trade in Pittsburgh and vicinity must attend sheet metal classes at the Carnegie Institute of Technology during the last four years of their apprenticeship, or until after they have finished the course for sheet metal apprentices. Further the agreement states that this training shall be for one day a week from Oct. 1 to May 1 during each of the four years and that the apprentice will receive his regular pay from his employer for the days so spent in training. Each apprentice, however, must pay his own tuition fee.

At the present time there are 65 apprentices receiving instruction at the school and special subjects have been added to the cirriculum. One of the inducements is the reward for scholarship. Receivers of Grade A will have their terms of apprenticeship shortened by two months thereby obtaining increased compensation earlier.

Westinghouse in Big Japanese Merger

A cable to the Chicago *Tribune* states that a big Japanese-American combine has just been effected. The Westinghouse Electric and Mitsubishi and Takata electrical interests have combined to form the Mitsubishi Electric Co., to manufacture and sell electrical equipment in Japan.

Through the combination American interests supplant German interests which heretofore have been closely affiliated with the Takata group. The company was incorporated for 15,000,000 yen ($7,500,000) to manufacture electrical goods and steam and electrical turbines. Shops are maintained at Kobe, Nagasaki and Nagoya and ground has been broken for the construction of a main plant at Nagoya to employ 4,000.

According to the agreement the Japanese corporation will get all the Japanese patent rights of the Westinghouse Electric & Manufacturing Co., while the Westinghouse International Co. will become the licensee of the Mitsubishi and Takata patents for the rest of the world.

Obituary

Lewis H. Nash, president of the Nash Engineering Co., South Norwalk, Conn., died Saturday, Nov. 17 after a brief illness. He was 71 years of age. Mr. Nash was born in South Norwalk and after his early education was completed he served an apprenticeship at the Norwalk Iron Works, becoming an expert machinist, and afterwards entered the Stevens Institute of Technology where he pursued the full course of mechanical engineering class of 1877. His death makes the first break in the ranks of graduates of that class. Upon graduation he received the degree of Mechanical Engineer and in 1921 the Institute conferred upon him the degree of Doctor of Engineering. From 1877 to 1905 he was chief engineer of the National Meter Co., Brooklyn, N. Y., and was the inventor of the Nash water meter and Nash gas engine made by that company. In 1905 he organized the Nash Engineering Co., manufacturer of the Nash hydropneumatic turbine air compressors and vacuum pumps. Mr. Nash was prominent in business, civic and fraternal circles and during his lifetime secured a large number of patents on mechanical devices used in products of the National Meter Co. and the Nash Engineering Co.

W. H. Stockham, of Birmingham, Ala., president of the Stockham Pipe & Fittings Co., and one of the best known iron and steel manufacturers of the South, died recently at his home in Birmingham.

William H. Jones, former superintendent of the Crosby Co., Buffalo, died recently at his home on a farm near Lockport, N. Y. Mr. Jones had retired to his farm in 1922 because of ill health. He was fifty-four years old and had been with the Crosby company since 1896.

Hugo Scherer, president of the Detroit Forging Co., Detroit, Mich., died recently in that city.

Personals

E. C. HENN, vice-president and general superintendent of the National Acme Co., has resigned his position as general superintendent. He has been succeeded as general superintendent by his son, Oliver L. Henn, formerly superintendent of the Windsor, Vt., plant of the National Acme Co.

GORDON H. STEWART, formerly representative of the Illinois Tool Co. in Detroit, has become Detroit manager of the Union Twist Drill Co., Athol, Mass.

R. P. MCCORMICK has been appointed Eastern sales manager of the Pawling & Harnischfeger Co. of Milwaukee. His headquarters will be at 50 Church St., New York City, and at 605 Stephen Girard Building, Philadelphia.

ALLEN C. SULLIVAN has charge of the newly opened Northwest branch of the Chain Belt Co., Milwaukee and his headquarters will be in Portland, Ore. Mr. Sullivan was formerly with the Allis-Chalmers Co., Milwaukee.

C. H. LANG will be the assistant manager of the newly created advertising and publication department of the General Electric Co., Schenectady, N. Y

EUGENE P. THORNTON has been appointed assistant district sales manager in the Southeastern territory for the Russell Manufacturing Co., Middletown, Conn. He succeeds O. G. WHITNEY who has been appointed manager of the Southwestern territory. Mr. Thornton's headquarters will be in Atlanta, Ga.

E. M. HERR, president of the Westinghouse Electric & Manufacturing Co., has been elected president of the Electrical Manufacturers Club.

WILLIAM KLINGENHOEFER has been made sales manager of the Latrobe Tool Co., Latrobe, Pa. He was formerly with the American Foundry & Construction Co., Pittsburgh.

DON B. CATTON, formerly with the Meese & Gottfried Co., will be the special sales representative for the Chain Belt Co., Milwaukee, Wis., in the Northwest territory.

W. H. DULEY has been appointed manager of the New Haven, Conn. branch of the Colonial Steel Co., Pittsburgh, Pa., Mr. Duley has been connected with the Chicago office of this company for some time.

WILLIAM F. NICHOLS will have charge of the Seattle and British Columbia territories for the Chain Belt Co., Milwaukee. His headquarters will be in Seattle. He was formerly with the Meese & Gottfried Co.

"JIM" STEWART, nationally-known motor truck transportation engineer, has resigned as general sales manager of the Signal Motor Truck Co., Detroit, Mich. to become associated with the Standard Motor Truck Co. He has been the Chicago branch manager for Kelly-Springfield; Chicago distributor for Acme, Clydesdale and Atterbury, and vice-president and general manager of Selden Sales & Service Co.

WILLIAM PORTER WHITE has been appointed to act as assistant to M. O. TROY, new executive assistant manager of the central station department of the General Electric Co., according to a recent announcement. His headquarters will probably be at Schenectady in common with Mr. Troy.

Business Items

The Philadelphia division of the B. F. Sturtevant Co., Boston, Mass., is now located at Thorne and Copewood Sts., Camden, N. J.

The Goss & De Leeuw Machine Co., New Britain, Conn., has been opened and production started. Stanley T. Goss was formerly sales manager of the New Britain Machine Co. and A. L. De Leeuw is a consulting engineer well known in the machine tool industry.

The Cleveland Duplex Machinery Co., Cleveland, Ohio, will move to larger quarters in the Penton Building, West Third St. and Lakeside Ave. on Dec. 1.

The Marshall & Huschart Machinery Co., 17 S. Jefferson St. Chicago, has been appointed exclusive agents in the Chicago territory for the V. & O. Press Co., Hudson, N. Y. L. F. Carlton is the factory representative working with the Marshall & Huschart company.

All patents, rights and stock of the Robinson Adjustable Center Co., Detroit, have been purchased by the Eclipse Interchangeable Counterbore Co., it was announced by officials of the Eclipse company this week at the main office in Detroit.

Receivers appointed Nov. 16, for the Acme Tool Co., of Ansonia, Conn., are the Home Trust Co. of Ansonia and Samuel Persky of the law firm of Stoddard, Goodheart & Persky of New Haven.

Automobile, truck and tractor parts, units and accessories will be manufactured by the Wausau Parts Manufacturing Co. which has been incorporated with $50,000 capital stock by W. C. Landon, W. F. Scholfield and Karl Mathie, all of Wausau, Wis.

In order to broaden the scope of the business the Alabama Machinery & Supply Co., a large firm at Montgomery, Ala., has increased its capital from $100,000 to $300,000, according to information received from one of the officials of the company recently.

The Remy Electric Co. of Anderson, Ind., one of the accessory and parts group of the General Motors Corp. has just purchased the plant formerly owned by the Arvac Manufacturing Co., of the same city. The Arvac company was builder of universal joints and other automotive parts.

It was recently announced in Atlanta by R. B. Pegram, vice-president of the Southern Railway Co., that the company has ordered 50,000 tons of new steel rails of the 100 lb. type mostly, for building 327 miles of track in various sections. More than 40,000 tons of the order will be produced in the Enseley, Ala., mills of the Tennessee Coal, Iron & Railroad Co., while the rest will be produced in Northern mills.

Authority to issue equipment-trust certificates to cover purchases of rolling stock to cost $37,260,000 has been sought of the Interstate Commerce Commission by the Southern Pacific Railway Co. With that large sum, the railroad company expects to purchase: 84 heavy freight locomotives; 15 passenger locomotives; 10 heavy passenger locomotives; 10 locomotive tenders; 10 electric locomotives; 2,000 steel underframe automobile cars; 500 steel underframe stock cars; 3,700 steel underframe box cars; 350 steel underframe flat cars; 1,150 steel underframe gondola cars; 300 composite steel and wood flat cars; 557 steel underframe work cars; 500 steel underframe logging cars; 90 steel underframe caboose cars; three steel underframe snow-plows; 150 steel electric motor coaches; 85 steel passenger coaches; 15 steel baggage coaches; 10 steel dining cars; 40 steel baggage-postal cars, and 16 steel buffet-baggage cars.

The Central of Georgia Railway Co. will at once rebuild its shops destroyed by fire at Savannah, Ga., a few days ago at a loss of $1,000,000, according to W. A. Winburn, president. Coach shop, planing mill, and other buildings of the plant were destroyed or badly damaged by the fire.

The Cox Foundry Co., of Bessemer, Ala., manufacturers of soil pipe and fittings, has taken over the plant of the City Foundry Co., manufacturers of building and municipal work castings, and is operating it as a separate unit of the Cox plant.

The Steel Products Corp. has been organized at Sheboygan, Wis., and incorporated with $100,000 with authority to undertake a wide field of manufacturing and marketing of steel products. The incorporators are Fred Zschetzsche, A. G. Stuedemann and W. B. Collins, attorney. Information concerning the new concern's plans will not be revealed until some time later.

The California-Oregon Metals Co. of San Francisco, Calif., has been incorporated. The company is capitalized at $250,000 and has the following directors: Eugene W. Kay, E. Draper Wilson and Oliver W. Kay.

A machine shop and foundry is being established at Rockingham, N. C., by the Victory Manufacturing Co., recently formed there, according to F. I. Mason, who has been named president and general manager.

Some new machinery will be needed for the rebuilding of the plant of the Eastern States Packing Co., Orchard Park, N. Y., which was recently destroyed by fire. The total damage to the plant and machinery was estimated at $100,000.

An order to show cause why a receiver should not be appointed for the Ogren Motor Car Co., 692-702 National Ave., Milwaukee, has been entered in the Milwaukee County Circuit Court on the petition of the Cleveland Hardware Co., Cleveland O., a creditor. The Ogren company was established in Milwaukee about six years ago to manufacture a six-cylinder passenger automobile. For several months it has not been in production. Fred G. Smith is president, and Robert E. Wiltrout, secretary.

The Industrial Review

Outlook for the coming year bright and machine tool builders are preparing for it

MACHINE tool business for the first eleven months of 1923 proved to be better in volume and in the total amount realized than the entire year of 1922 by from twenty-five to thirty per cent, according to estimates made by dealers in various parts of the country. With the railroads and the automobile makers both good customers, business has been maintained at a rather even pace for most of the year.

During the month of November business was fair and the general industrials were the purchasers rather than either the automotive industry or the railroads. The promised and expected buying by the roads did not materialize to the extent hoped, nor is it anticipated that machine tool buying in quantity will take place before the first of the new year.

The automotive industry has purchased only sparingly during the month, but makers of automobile parts and accessories have proved good buyers. Schedules of production for the coming year in the automotive field furnish the basis for much optimism among machine tool builders. It is anticipated that more machine tools will be needed in 1924 by the automobile builders than during the present year and plans are being made accordingly.

Textile makers in the New England states have not been buying much equipment since June, but the Southern plants have been in the market continually for machine tools as well as machinery. This business should show improvement in the Northeast within a month.

Demand for Woodworking Machinery

Woodworking machinery has been sold in good quantity during November around the Middle West and in the Northwest. Mining machinery has found a better market since the first part of October and builders of railroad cars and locomotives have both been customers during the past month.

The only definitely bad report during the past four weeks has been from the St. Louis district where business is said to be poor at the present time. The oil fields of the Southwest are not busy, but other industries in Texas and Oklahoma are reported as thriving so orders may be looked for within a short time.

Trade with Japan up to the present writing has been mostly indirect. Both the Ford Motor Co. and the Pierce-Arrow Motor Car Co. have sent trucks to Tokio and there have been some steel shipments also. Concrete mixers and woodworking machinery have been ordered, but none of the expected machine tools have been purchased. Inquiries have been plentiful from Japan and assurances of future buying have been forthcoming so that the machine tool builders are still hopeful of this business being added to the sales of the forthcoming year.

Reports from important electrical centers of the United States show some contrasts in the business as a whole. In a number of items production and distribution are at high levels, while in other lines one or the other of these factors is below normal conditions. The present lack of balance in the market is indicated by an unprecedented demand for all household appliances and novelties, while the industrial side of the industry is left with few orders of importance. The situation has been of this character for a number of weeks, although the general market has seen continued improvement. Power equipment is fair, with a slacking off in transmission towers and equipment.

> General industrials were the purchasers during November with the railroads adding a little toward the last of the month; holiday business occupies the electrical industry to the exclusion of heavier products; electric railway business has improved and car shops are on an efficiency basis; chemicals are steadier; mining interests report a good year and equipment buying is expected in Michigan; building statistics are at record figures, although October showed a decline from the previous month.

In the South manufacturers report excellent sales of outdoor transformer equipment, with deliveries running at from five to six months. Smaller sizes are running from six to sixteen weeks. Turbo-generator sales in the South are smaller than expected. In the Middle West the demand for rubber-covered wire has been enlivened by small price reductions effected several weeks ago. Transformers there have been reduced approximately 10 per cent owing to increased manufacturing facilities. Cautious rubber-covered wire buying is reported on the West Coast, where, as in other sections of the country, household appliances are attracting most attention.

Electric Railways

Statistics of the electric railway car repair shop industry just made public point the trend of developments in this line. The number of such shops has decreased from 624 in 1919 to 560 in 1921. During the same time, however, the number of employees has increased from 33,120 to 35,638. These are the bare outstanding figures. By the electric railway industry they are interpreted as bearing out the noticeable tendency toward larger shops and greater concentration of work. With this concentration has come a redistribution of equipment better suited to the needs of the shops. Prices for material consumed in the shops have, of course, been constantly on the increase, but even allowing for that, the figures of the value of the products turned out and of the cost of material consumed bear out the slowly but constantly growing magnitude of the shop work. They are: cost of material, 1921, $33,560,133; 1919, $32,025,484; 1914, $17,609,574. Value of products: 1921, $87,312,426; 1919, $75,210,701; 1914, $38,576,565. This growth is not spectacular. The railway industry is not a spectacular industry. It is, however, a growth that may be expected to continue indefinitely the constant record of more work done, more men required and more machines and equipment needed to do the work.

Chemicals Improve

Business in the chemical field is characterized as steady with few expansions but with hopes of growth during the coming year. There are many industries that contribute to the chemical trade, such as textile, paint, silk, drugs and other industries. Most of these have been enjoying good business during the year and it has been reflected to some extent in the chemical line. During November it was noted that heavy chemicals were moving well and recent exports proved to be larger than for the same period last year.

Mining Conditions

Machinery buying has been rather active in the Canadian mines of Ontario and in Arizona indications are that new equipment will be placed before many months. Minnesota mining is never active during the cold months. In Michigan the copper interests are planning improvements provided the price of copper shows the improvement that it has during the past few weeks. Just completed and ready for operation within a few months in the new salt mine at Retsof, N. Y., near Rochester. This will be the biggest salt mine in the United States when it is in operation, it is asserted.

Coal mining increased a trifle during the past two weeks to meet the demands of the buying public. In both the bituminous and the anthracite fields production was greater than in October if you except election day and the day following. A significant fact is recorded in West Virginia where the "smokeless operators" opposed a wage reduction proposal which would indicate that these owners do not relish the idea of more trouble and are willing to pay the difference demanded rather than suffer another costly strike.

Construction

Building figures for the month of October show a decrease as compared with the previous month of about five per cent, but a substantial increase as compared with the figures of October, 1922. The September totals were exceptionally large after those of August and July so that it is fair to state that October is at least an average month.

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry based on current developments

By THEODORE H. PRICE
Editor, *Commerce and Finance*, New York

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THE discerning observer must be impressed by the change that appears to have come over most of the commodity markets as well as the Stock Exchange of late. In detail the return of confidence and a normal optimism are attributable to a recognition of the favorable influences to which attention has been drawn in these letters for some time past. But the willingness of the public to interpret the facts by investing its money in goods or securities is significant of a psychological condition that is due to something more profound than the conventional "causerie" of the market place.

To appreciate the significance of this alteration in the popular mental attitude it is only necessary to consider the uncertainties which seem to becloud the future here and abroad. In this country we are approaching a presidential campaign whose result may be a reversal of our public policy in many important respects. Congress is about to meet and it is possible that it may pass a bonus bill that will increase the national debt by from two to five billion dollars and enact other legislation that will be anti-capitalistic in its character and purpose.

Great Britain is in the throes of a political campaign in which "free trade versus protection" is the leading issue. If the protectionists win, American goods may be shut out of many important British markets.

The Entente alliance is perilously near disruption. The German government is confessedly bankrupt. The hope that France can collect the reparations out of which she expected to pay her debts has been indefinitely deferred and the purchasing power of Europe and its financial credit are apparently diminishing from day to day.

And yet in the face of all this there is a distinct revival of both investment and speculation in England as well as in the United States, and even in Berlin and Paris prices are advancing as the value of the paper currencies used there declines.

A return to the gold standard by any of the important commercial nations of the old world is hardly possible during the present decade and it is not even discussed by their statesmen. Even in Great Britain indirect inflation through the issuance of government loans seems necessary in order to provide doles or employment for the unemployed and as the value of sterling declines all the gold produced or hoarded is gradually drifting to the United States in payment for the cotton and food that Europe must buy here.

The result is that the $3,135,000,000 of gold held by the Federal Reserve Banks last Thursday evening was 77.1 per cent of their deposit and Federal Reserve note liabilities combined and that it would be very nearly 100 per cent of those liabilities were it not for the constant effort to get gold into circulation that is being made by paying out "yellow backs" or gold certificates. Meantime the demand for rediscounts is decreasing and the consequence is that both the Federal Reserve Banks and the member banks are being compelled to buy acceptances and government obligations to employ their resources.

We are therefore facing inflation on both sides the Atlantic. In Europe it is the inflation that results from the emission of unsecured paper money. In America it is called "gold inflation" which is the phrase that has been coined to describe the expansion in the supply of credit made available under our Federal Reserve System by the preponderant portion of the world's gold now impounded in the banks of that system.

> "In this country new bond issues are being marketed at the rate of at least $150,000,000 a week. The telephone issue of $100,000,000 was absorbed in a day. The total of Land Bank bonds already sold is well in excess of a billion dollars and despite their alleged inpecuniosity, the railroads claim that they will spend two billions on improvements and new equipment during the current year."

When the Federal Reserve Act was passed no one dreamed that we would ever attract hither sixty per cent of the world's monetary gold, but it is here, it keeps coming and the consequence is that it has become so easy to borrow that every nation and every enterprise that have any credit is selling obligations or shares whose proceeds are expended in the employment of labor or the purchase of materials at gradually rising prices.

In London a few weeks ago subscriptions totalling over £100,000,000 were received for an offering of £8,000,000 in the stock of a company formed to acquire five leading English newspapers and only last week the cables announced that foreign loans amounting to over fifty million sterling in the aggregate were practically arranged for and would shortly be brought out by British bankers.

In this country new bond issues are being marketed at the rate of at least $150,000,000 a week. The telephone issue of $100,000,000 was absorbed in a day. The total of Land Bank bonds already sold is well in excess of a billion dollars and despite their alleged impecuniosity the railroads claim that they will spend two billions on improvements and new equipment during the current year.

In the final analysis inflation is the rapid expenditure of easily borrowed money and these are only a few of the outstanding financial transactions which make it clear that most of the world is engaged in thus borrowing and spending.

The business mind is coming to have a subconscious appreciation of this condition and as long as it lasts it is unlikely that political or social adversity or even war itself will check the upward tendency of the general price level. An excessive supply of this or that article or a change in fashion may cause a temporary decline in the value of specialties, but upon the whole higher prices are indicated until it becomes more difficult to borrow.

Just when this will occur it is hard to say. An advance in interest rates will be the first intimation of a change. Thus far there is no indication of tighter money and some are predicting an early reduction in the rediscount rate by the Federal Reserve Banks. This prediction is based upon the theory that the present administration is anxious to curry favor with the farmer by providing him with cheap money.

This may be a mistake but the criticism visited upon the Federal Reserve Board for the deflation and decline in prices which followed the advance in interest rates ordered three years ago makes it reasonably certain that the history of that sad period will not repeat itself, at least until after the election of 1924.

This is the larger view of the situation written at the end of a week during which the markets have been upon the whole monotonously firm and without any special feature unless it be the strength of the railway stocks, which seem to be at last reflecting the probability that the net earnings of the Class I roads for the year 1923 may reach a billion dollars.

An enormous holiday trade is expected by the retail merchants. A seasonal slackness in the distribution of staples will therefore be natural and is expected during the next four weeks, but after the New Year an active demand for essentials is anticipated and seems probable, barring only some sinister development of which there is no indication at present. Most people are preparing for a year equally as good as 1923 proved to be.

Fewer Combinations of Brass Traps Urged

Manufacturers of tubular plumbing goods, meeting Nov. 16 with the Division of Simplified Practices of the Department of Commerce, unanimously recommended that 1,114 varieties of combinations of brass traps now being produced be reduced to 119 combinations.

Specifications of these 119 combinations, which a survey conducted by the industry disclosed represented 85 per cent of the present production, will be submitted to the entire industry for approval or for such additions or eliminations as may be considered necessary. A general conference then will be called by the Division of representatives of manufacturers, distributors and users together with architects and engineers, to make the recommendation effective.

The survey showed that of the 1,114 combinations being produced, 382 represented 98½ per cent of all sales, leaving 732 to be manufactured, carried in stock and sold to satisfy 1½ per cent of the demand. The 119 selected as sufficient as they already satisfy 85 per cent of the demand were said to cover the range of all reasonable requirements.

Attending the preliminary conference Nov. 16 were: A. A. Ainsworth, secretary of the Tubular Plumbing Goods Association, Philadelphia; S. P. Hackley, the Bridgeport Brass Co., Bridgeport, Conn.; A. E. Moulton, the Wolff Manufacturing Co., Chicago; P. H. Cruikshank, the H. Mueller Manufacturing Co., Decatur, Ill.; H. C. Bulkeley, the American Sanitary Manufacturing Co., Abingdon, Ill.; K. L. Legner, and C. J. Muend, the Haines, Jones & Cadbury Co., Philadelphia; A. C. Recker, the Waterbury Manufacturing Co., Waterbury, Conn.; H. J. Mason, the American Pin Co., Atlanta; W. W. Bowers, the American Pin Co., Waterbury, Conn.; W. J. Frost, the Frost Manufacturing Co., Kenosha, Wis.; M. S. Little, the M. S. Little Manufacturing Co., Hartford, Conn.; Paul E. Holden, U. S. Chamber of Commerce; Dr. Hunter, Bureau of Standards; Capt. Hobson, War Department; Wm. A. Durgin, chief of the Division of Simplified Practices.

Plan Training for Apprentices

General principles which it was agreed should underlie apprenticeship training in the building trades were formulated at a conference in Washington Nov. 15 between the Federal Board for Vocational Education and representatives of employers and employees and material supply manufacturers.

Eight general principles were laid down. They are:

1—That a local representative committee composed of all interests in the industry is essential to determine the needs and supervise the training.

2—That part-time or evening schools should be provided to supplement job training.

3—That all-around training is more desirable than specialized training.

4—That the national associations should set up fundamental training standards for apprentice training and make the information thereon available for instructional purposes.

5—That co-operation with the public schools is essential to the promotion of apprentice education.

6—That incentives should be set up to induce boys to enter apprenticeship.

7—That pre-employment training for employed apprentices or boys under contract is recommended.

8—That emphasis should be placed on dull-season training to follow the initial training given in the pre-employment period.

A number of those attending the conference, which was called for discussion of the apprenticeship problem rather than for immediate definite action, recited plans which have been followed in various trades at specific localities to induce more young men to enter apprenticeship, or which have been devised to be put into operation soon.

Auto Body Building in Detroit

Detroit is now producing seven-eighths of the country's automobile bodies, which means that it is the center of the body industry. Out of a total of 3,000,000 bodies manufactured in the United States, Detroit's output should reach 2,500,000. The bodies range from $100 for light, quantity bodies, to $1,300 and $1,500 for quality designs. An enormous equipment is necessary to provide bodies for cars made in this section. The Fisher Body Corp. alone has 32 large plants, each employing from 1,000 to 4,000 men. Other body manufacturers are the Briggs Manufacturing Co., which makes bodies for the Ford and Hudson cars, the C. R. Wilson Body Co., making bodies for Willys-Overland and Reo, the Towson Body Co., turning out body jobs for Packard and Lincoln, and the American Body Corp., supplying Stutz bodies. A score of smaller companies, in the aggregate, swell the production materially.

Trade Catalogs

Flexible Coupling. The De Laval Steam Turbine Co., Trenton, N. J. The De Laval flexible coupling is described in a twelve-page catalog. This coupling which has been developed for turbines or other motors. The product is illustrated and the text minutely tells of the details. There are charts and section drawings contained in the booklet.

Multiple Spindle Chucking Machine. The Goss & De Leeuw Machine Co., New Britain, Conn. The many features of this new machine are described in this catalog. The booklet is well illustrated showing parts of the machine and methods of use.

Air Hoists. The Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill. The many uses of air hoists in factories and mills are shown by this booklet. Blue prints of the device are also included in the catalog.

Electric Motors. The Reliance Electric & Engineering Co., Cleveland, Ohio. The advantages of electric motors and how to choose and use them for various kinds of work are told in this booklet. The application of motors and the horsepower needed for different machine tools are listed in the catalog.

Electric Drills. The Independent Pneumatic Tool Co., 600 W. Jackson Boulevard, Chicago, Ill. A 23x40 in. wall chart listing the symbol numbers of all parts used in the construction of Thor electric drills of ¼ in., ⅜ in., ½ in., and ¾ in. capacity. Photographs of the major parts make identification easy. The chart is printed on heavy paper, suitable for tacking on the wall in the toolroom or repair shop.

Dial Gages. The B. C. Ames Co., Waltham, Mass. The Ames micrometer dial gages are described and illustrated in a 16-page booklet. Each part is illustrated and the construction of the instruments is told in detail.

Gears and Pinions. The Union Gear & Machine Co., 27 Purchase St., Boston, Mass. The noiseless gears and pinions marketed under the trade name "Formica" are described in this catalog. Price lists of different sized gears are contained in the catalog as well as valuable tables relating to the subject.

Underfeed Stokers. The Westinghouse Electric & Manufacturing Co., Stoker Department, South Philadelphia Works, Philadelphia, Pa. Stoking apparatus and the new model multiple retort underfeed stoker are shown by illustration, explanatory text and diagrams in this 14-page booklet.

Grinders. The Graham Manufacturing Co., Providence, R. I. Machines for the rapid and accurate production of flat surfaces are described as to construction and operation. Drawings of the grinders and pictures of both assembled machines and of parts are contained in the folder.

Motors. The Wagner Electric Corp., St. Louis, Mo. The Fynn-Weichsel motor made by this corporation is described in an attractive four-page folder that has been issued. A chart showing the load characteristics is also shown.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

Drilling equipment for oil wells. Tampico, Mexico. Agency. Reference No. 8175.

Hydraulic machinery. Caracas, Venezuela. Agency. Reference No. 8174.

Automobile factory equipment such as lathes, shears, chucks, grinding and polishing machines and woodworking machinery. Warsaw, Poland. Agency. Reference No. 8187.

Forthcoming Meetings

American Society of Mechanical Engineers. Annual meeting, Dec. 3 to 6, in New York City. Calvin W. Rice, 29 W. 39th St., New York City, secretary.

National Exposition of Power and Mechanical Engineering. Second annual exposition to be held at the Grand Central Palace, New York City, Dec. 3 to 8. Headquarters, Grand Central Palace, New York City.

Society of Automotive Engineers. Annual meeting, Jan. 22 to 25, at the General Motors Building, Detroit, Mich. Coker F. Clarkson, 29 W. 39th St., secretary.

American Gear Manufacturers Association. Spring Meeting. April 28, 29 and 30, 1924. Lafayette Hotel, Buffalo, N. Y.

Society of Industrial Engineers. Eleventh annual convention. Buffalo, N. Y. April 30, May 1 and 2. Headquarters, 608 S. Dearborn St., Chicago, George C. Dent, executive secretary.

Southern Supply & Machinery Dealers Association, National Supply & Machinery Dealers Association, and American Supply & Machinery Manufacturers Association. Triple convention, May 19, 20 and 21, 1924, Hotel Cleveland, Cleveland, Ohio. F. D. Mitchell, secretary-treasurer, 1819 Broadway, New York City.

Foreign Trade Council. Eleventh annual convention at Boston, June 4, 5 and 6. O. K. Davis, India House, Hanover Square, New York City, secretary.

The General Committee of Dividion V, Mechanical of the American Railway Association. Convention and exhibits. Atlantic City, June 11-18.

Railway Supply Manufacturers Association. Exhibit. Atlantic City, June 11-18, 1924.

New and Enlarged Shops

Machine Tools Wanted

Del., Wilmington—Electric Hose & Rubber Co., 12th and Dure Sts., W. C. Briggs, Purch. Agt.—boring lathe, 24 in. swing, for boring out large size pipe.

Fla., Jacksonville—H. W. Dexter, Bisbee Bldg.—60 in. lathe and 60 in. clipper for veneer work; shear that will handle ¼ x 60 in. sheets for the manufacture of dredging pipe.

Ill., Elgin—C. A. Kerber, 440 Chicago St.—boring machine and chain hoist for garage.

Kan., Columbus—H. Hudson, R. R. 6—lathe, drill press, emery stand and wheel for garage.

Kan., Pittsburg—W. W. Wilson, 210½ South Bway.—drill press and lathe for machine shop.

Md., Baltimore—Eastwick Motor Co., 120 West North Ave.—lathe, drill press, etc., for automobile repair work.

Mich., Battle Creek—Rich Steel Products Co.—milling and cutting machines, shapers, drill presses, lathes, grinders, etc., for proposed $42,000 factory for the manufacture of castings, machinery and parts.

Mich., Detroit—H. Jensen, 3745 Crane Ave. (machine work)—one lathe, 10 in. swing, about 4 ft. bed (used).

Mo., Joplin—County Line Garage, Route A, L. H. Higginbotham, Purch. Agt.—air valve grinder.

Mo., St. Louis—M. Boettigheimer, 2649 Pestalozzi St.—lathes and general equipment for garage.

N. Y., Binghamton—Binghamton Auto-Renewal Co., 475 Court St., C. Thompson, Purch. Agt.—tools, press, vise, hoist and equipment.

N. Y., Buffalo—Atlantic Lumber Co., 1055 Seneca St.—tools and equipment for garage.

N. Y., Buffalo—F. L. Baldwin, 1654 Weston Ave.—tools, equipment and pump for service station and garage.

N. Y., Buffalo—G. Bova, 432 Plymouth Ave.—equipment for garage repair shop.

N. Y., Buffalo—S. Lipowicz, 758 Fillmore Ave.—equipment for garage repair shop.

N. Y., Elmira—P. H. Serio, 158 Fox St.—belting, hangers, pulleys, drill press and equipment for proposed $12,000 factory for the manufacture of specialties.

N. Y., Jamestown—F. L. Frick Garage, 317 Washington St.—tools, equipment, drill press and small lathe for new service station.

N. Y., Le Roy—R. W. Stroebel—garage repair tools and equipment.

N. Y., New York—Carr Bros., 65 Bway.—O. M. portable electrically driven grinder.

N. Y., New York—Sturtevant Tool Co., 1023 East 178th St.—No. 18 or 19 Bliss press.

N. Y., Pulaski—A. M. Gates—garage tools and equipment; press and drilling machine for the manufacture of light accessories.

N. Y., South Otselic—F. Crandall—repair tools, press, vise and equipment for new garage.

N. Y., Stillwater — Wood-Flong Corp. (manufacturer of paper), C. W. Townsend, Mgr.—three beaters, also lathe, pipe threading drill, etc., for machine shop.

O., Columbus—G. C. Hancock Electric Co., 20 East Spring St.—machinery for stamping and spinning brass for lighting fixtures.

O., Defiance—Clay Products Co., J. Molly, Mgr.—machine shop equipment, including lathes, drilling machines and tools.

O., Sidney—Sidney Brass Wks. Co. (machine shop and brass foundry), L. Linder, Mgr.—equipment, including one grinder, to enlarge shop.

O., Toledo—The city, A. Jackson, Service Dir.—complete machinery and equipment for proposed $160,000 [illegible] and repair shop.

O., Youngstown—B. H. Carmer, Mahoning Ave.—equipment, including pump and tools for proposed garage and service station.

O. Portland—Packard Service & Sales Co., [illegible] and Burnside Sts.—lathes, milling mac[illegible] drills, etc., for proposed $75,000 gar[illegible]

P[illegible]bethlehem—W. A. Wilbur, 3rd and Sene[illegible]Sts.—drill press, tools and repair equip[illegible]t for garage, to replace fire loss.

Pa., Butler—Steel Car Forge Co.—belt driven alligator shears, 1¼ in. round capacity.

Pa., Coplay—J. Stengel, Ruch St.—10 to 12 in. lathe, tools, press, emery wheel, stand and equipment for garage and repair shop.

Pa., Duncansville — S. P. Wilt — small lathe, press, repair tools and emery wheel for proposed addition to automobile repair shop.

Pa., Wilkes-Barre—H. Fierman, 93 South State St.—repair tools, press and work shop equipment.

Va., Roanoke—Norfolk & Western R.R., J. H. Clemmitt, Purch. Agt.—lathe and chuck, 16 in. x 4 ft.; No. 2 Universal milling machine; 60 in. x 12 ft. engine lathe with chuck jaws, all motor driven.

Wis., Milwaukee — Eslien Sheet Metal Wks., 1001 30th St.—sheet metal working machinery for proposed $60,000 factory.

Wis., Milwaukee—Individual Last Mfg. Co., c/o S. I. Rosefelt, 216 West Water St. (manufacturer of shoe lasts)—casting machine and drill press.

Wis., Sheboygan—F. Zschetzsche, 426 Grant St. (manufacturer of automobile parts)—grinder and hacksaw.

Wis., Wausau—Wausau Parts Mfg. Co., c/o W. R. Schofield, 529 McClellan St.—emery grinder, tool room lathe and one boring machine.

Que., Matane—W. Banville—tools and repair equipment for garage.

Que., Mont Joli—L. Hammond—press, tools and repair shop equipment for garage.

Que., Montreal—A. Papineau, 560 Carriere St.—equipment, garage repair tools, etc.

Que., Montreal—B. Simon, 2746 Papineau Ave.—tools, equipment and emery wheel for automobile repair shop.

Que., Montreal—A. Urquhart, 1640 St. James St.—small screw cutting lathe, 3 to 5 ft. bed.

Que., Quebec—E. Poulin, 133 Dupont St.—small lathe for garage.

Que., Rimouski—Riverin & Chasse—tools and other repair equipment for garage.

Machinery Wanted

Calif., Madera—The county, L. W. Cooper, Clk.—one 100 in. shew type laundry mangle.

Calif., San Rafael—County of Marin, R. E. Graham, Clk.—Rix compressor and air drill for Road Dist. 4, cost not to exceed $2,000.

Calif., Wasco—Wasco Creamery—equipment for proposed addition to creamery.

Colo., Colorado Springs—El Paso County Democrat, 28 North Nevada Ave.—linotype.

Ill., Chicago—M. Waldenberg, 54 West Kinzie St.—refrigeration equipment, brine type for proposed $150,000 apartment house.

Ill., Waukegan—Wilson & Ohm, 401 South Sheridan Rd.—air compressor, lathe and emery wheel for garage.

Ind., Hammond—Beatty Machine & Mfg. Co.—air compressor, capacity 1,500 to 2,000 cu.ft. per min.

Ia., Milo—Milo Enterprise, J. A. Harris, Purch. Agt.—gas burning typograph machine.

Kan., Bonner Springs—Kansas Portland Cement Co.—equipment for proposed cement mill.

Kan., Neodesha—H. V. Baxter—newspaper press, belting, hangers and pulleys.

Kan., Paola—E. McNutt—one 8 x 12 in. and one 10 x 15 in. job printing press.

Kan., Treece—V. Morris—shoe finisher, stitcher, belting, hangers and shafting.

Ky., Benton—J. M. Johnson—equipment for grist mill.

Ky., Louisville—Office of United States Engineer, P. O. Box 72—one 6,500 lb. pile driver hammer for Dam 46 at Owensboro.

La., Cedar Grove—R. Quarris—cylinder press and paper cutter.

Mich., Detroit—Detroit Auto & Machine Wks., 7640 Gratiot Ave.—plating equipment, including dynamo and medium size tanks.

Mich., Detroit—J. Takieli, 9201 Home St.—two circular rip saws with equipment, size 44 to 52 in.

Mich., Winona—Pampa Land Co.—power rip saw and one large band sawmill.

Mo., Joplin—Hargis Printing Co., 111 East 4th St., W. Hargis, Purch. Agt.—round cornering machine.

Mo., St. Louis—Abramson-Resnick Printing Co., 1102 High St.—8 x 12 in. job press with motor.

Mo., St. Louis—Missouri-Kansas-Texas R.R. Co., 1520 Ry. Exch. Bldg., G. E. Scott, Purch. Agt.—receiving bids Dec. 5 for 1,600 steel striking castings and 1,300 steel coupler yokes.

N. Y., Amsterdam—Merwin & Clapp Apron Mfg. Co.—complete machinery and equipment for proposed $250,000 plant, to replace fire loss.

N. Y., Batavia—Genesee Stone Products Co., J. W. Foster, Supt.—quarry machinery and equipment, including compressed air drills and conveyors.

N. Y., Buffalo—Danahy Packing Co., 25 Metcalf St.—equipment for proposed addition to packing house.

N. Y., Buffalo—Kensington Davis Corp., 144 Kensington St.—foundry equipment for new $125,000 plant.

N. Y., Buffalo—Vetter Optical Co., Inc., 1271 East Ferry St.—equipment for light manufacturing.

N. Y., Canandaigua—Roper Knitting Co.—looms, hangers, pulleys, special machinery, etc., for proposed addition to factory.

N. Y., Fayetteville—Precision Die Casting Co., c/o A. H. Chase—machinery and equipment for expansion program.

N. Y., Fort Miller—Fort Miller Pulp & Paper Co., S. A. Thorpe, Mgr.—machinery for ground wood pulp mill, 100 ton daily capacity, water power only.

N. Y., Hudson—Hudson Fibre Co., Inc., H. Hudson, Pres.—rag picker, cotton card and condenser for making cotton bats.

N. Y., New York—Esquerre & Son, 150th St. and 7th Ave.—bandsaw.

N. Y., Rochester—C. Zarcone, 168 Jay St.—machinery and equipment for cigar plant, to replace that which was destroyed by fire.

N. Y., Syracuse—Cloverland Dairy Co., 250 Lincoln Ave., W. L. Brodeur, Glens Falls, Purch. Agt.—machinery for the manufacture of ice cream, etc., for immediate expansion program.

O., Barberton—Lambert Tire & Rubber Co., G. M. Collette, Mgr.—tire making equipment, including two mixing machines, two vulcanizers, etc.

O., Columbus—Modern Showcase & Fixture Co., 162 West Locust St., G. M. Schwartz, Pres.—woodworking machinery, one molding machine, two saws, also metal working machinery.

O., Lima—Ohio Steel Fdry.—foundry machinery and equipment.

O., Mogadore — E. Slusser — complete equipment for proposed bakery.

O., Sandusky—Gartland-Carroll Fdry. Co., West End, J. J. Carroll, Mgr.—foundry machinery and equipment for expansion program.

O., Stryker — Ohio Trent Coal, Coke & Amalgam Co., F. M. Burns, Secy.—coal handling machinery and equipment for new plant for the manufacture of amalgam, 500 ton daily capacity, at Toledo.

O., Youngstown—Concrete Products Co., W. G. Reese, 624 Martin St., Purch. Agt.—machinery and equipment for proposed plant for the manufacture of tile and concrete blocks.

Pa., Erie—F. H. Holmes, Jr., State and 26th Sts.—pumps and equipment for proposed service station.

The Weekly Price Guide

Rise and Fall of the Market

Iron and Steel—Active pig-iron buying in Birmingham market for first quarter delivery; possibilities of an upward trend in prices. Downward price tendencies in steel hoops, bands and galvanized sheets. Iron and steel scrap up. Steel structurals remain firm at the $2.50 base, with bars at $2.40 per 100 lb., Pittsburgh. Steel demand small, due to approach of inventory season. Buying of structurals, however, fairly active in New York district.

Advances—Tin, 1¾c. per lb. higher than week ago; market, however, shows tendency to weaken. Fabricated brass and copper products higher in New York. Solder up ⅛c. per lb. in Cleveland.

Declines—No improvement in volume of copper buying; price down ⅛c. per lb. in week. Zinc dropped 15c. per 100 lb. and antimony, ⅛c. per lb.; lead, steady in New York. Old copper lower in Cleveland. Linseed oil down 3c. in New York and 5c. per gal. in Cleveland.

IRON AND STEEL

PIG IRON—Per gross ton—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$25.05
Northern Basic	24.00
Southern Ohio No. 2	24.00
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	28.00
BIRMINGHAM	
No. 2 Foundry	22.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	24.25
Virginia No. 2	28.17
Basic	24.00
Grey Forge	24.00
CHICAGO	
No. 2 Foundry local	24.50
No. 2 Foundry, Southern (silicon 2.25@2.75)	27.00
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	25.77
Basic	25.77
Bessemer	26.77

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.75
Cleveland	4.75
Cincinnati	7.50
New York	5.00@5.50
Chicago	5.25@5.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh	New York	Cleveland	Chicago
No. 10	3.00	4.59	3.75	4.00
No. 12	3.10	4.64	3.80	4.05
No. 14	3.20	4.69	3.85	4.10
No. 16	3.40	4.79	3.95	4.20
Black				
Nos. 17 and 21	3.70	4.95	4.45	4.70
Nos. 22 and 24	3.75	5.00	4.50	4.70
Nos. 25 and 26	3.80	5.05	4.55	4.75
No. 28	3.85	5.15	4.65	4.85
Galvanized				
Nos. 10 and 11	3.90@4.00	5.15	4.70	4.85
Nos. 12 and 14	4.00@4.10	5.25	4.80	4.95
Nos. 17 and 21	4.30@4.40	5.55	5.10	5.24
Nos. 22 and 24	4.45@4.55	5.70	5.25	5.40
No. 26	4.60@4.70	5.85	5.50	5.55
No. 28	4.90@5.00	6.15	5.80	5.85

WROUGHT PIPE (Welded)—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. steel butt welded.	48%	34%	55½%	43½%	50%	37%
2½ to 6 in. steel lap welded.	44%	30%	53½%	40½%	47%	34%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 15%. Cast iron, standard sizes, 17½% off.

SEAMLESS STEEL TUBING—Following base discounts are on 20 gauge or .035-in., round, cold-drawn tubing, ⅛-in. to 1-in., O.D., weighing 0.17 lb. to 0.36 lb. per ft. Cutting charge per 100 cuts, $1.50 to $1.58:

O.D. Inches	List Price per ft.	Differential Discount	O.D. Inches	List Price per ft.	Differential Discount
⅛	$0.09	50%	⅞	$0.16	35%
⅜	.11	45%	1	.18	31%
¾	.14	40%			

NOTE—The discounts are to be lowered by the following differentials in the case of regular .10-.20 carbon: 25,000 ft. or over, 83; 15,000 to 25,000 ft., 82; 5,000 to 15,000 ft., 81; 1,000 to 5,000 ft., 80; less than 1,000 ft., 79.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.50
Spring steel (light) (base)	6.00	6.00	6.00
Coppered Bessemer rods (base)	6.53	8.00	6.55
Hoop steel	5.19	4.66	4.55
Cold rolled strip steel	7.50	8.25	7.25
Floor plates	5.80	5.66	5.80
Cold drawn shafting or screw	4.65	3.90	4.55
Cold drawn flats, squares	5.15	4.40	5.05
Structural shapes (base)	3.64	3.46	3.40
Soft steel bars (base)	3.54	3.36	3.20
Soft steel bar shapes (base)	3.54	3.36	3.20
Soft steel bands (base)	4.39	3.61	3.95
Tank plates (base)	3.64	3.46	3.30
Bar iron (3.10@3.15 at mill)	3.54	3.36	3.20
Tool steel	11.00	....	....
Drill rod (from list)	55%	40@55%	50%

Electric welding wire, New York, 5/32, 8.35c.; ⅛, 7.85c.; 5/32 to ¼, 7.35c. per lb.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York			13.62½
Tin, 5-ton lots, New York			45.37½
Lead (up to carlots), St. Louis	6.65	New York	7.22½
Zinc (up to carlots), St. Louis	6.25	New York	6.70

	New York	Cleveland	Chicago
Aluminum, 98 to 99% ingots, 1-15 ton lots	26.20	27.00	26.50
Antimony (Chinese), ton spot	10.00	10.50	10.50
Copper sheets, base	21.00	21.00@21.25	23.00
Copper wire, base	16.26	19.00	16.25
Copper bars, base	20.00	22.50	19.50
Copper tubing, base	23.50	27.25	23.00
Brass sheets, base	17.75	22.00	18.75
Brass tubing, base	22.00	27.00	20.50
Brass rods, base	15.50	18.00	15.75
Brass wire, base	18.25	22.00	....
Zinc sheets (casks)	10.25	10.45	....
Solder (½ and ½), (case lots)	31.00	30.50	28.50
Babbitt metal (83% tin)	52.00	54.00	45@48
Babbitt metal (35% tin)	25.00	17.50	20@25
Nickel (ingot and shot)	29.00	....	....
Nickel (electrolytic)	32.00	....	35.00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel sheet (base)	57.00
Hot rolled rods, Grade "A" (base)	55.00
Cold drawn rods, Grade "A" (base)	63.00

Shop Materials and Supplies

METALS—Continued

Copper nickel ingots	37.00
Hot rolled copper nickel rods (base)	45.00
Manganese nickel hot rolled rods "E"—low manganese (base)	57.00
Manganese nickel hot rolled rods "D"—high manganese (base)	60.00

Base price of monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	40.00
Blocks	32.00	Cold drawn rods (base)	48.00
Ingots	38.00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	11.75	11.00	11.25
Copper, heavy, and wire	10.75	10.50	10.50
Copper, light, and bottoms	9.50	8.75	9.50
Lead, heavy	5.75	5.25	5.75
Lead, tea	4.75	4.00	4.75
Brass, heavy, yellow	7.00		7.00
Brass, heavy, red	8.75	9.25	8.75
Brass, light	6.25	5.00	6.00
No. 1 yellow brass turnings	7.00	5.75	6.50
Zinc	3.75	2.75	3.75

TIN PLATES—American Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	20x28, 112 sheets	$25.10	$22.85	$18.50
"A" Grade:				
IC,	20x28, 112 sheets	21.40	18.00	17.00
	Coke Plates—Primes, 20x28 in.			
100-lb.,	112 sheets	14.00	13.00	14.10
	Terne Plates—Small lots, 8-lb. Coating			
IC.	14x20	8.25	6.55	7.40

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.10@0.13	$0.15	$0.14
Cotton waste, colored, per lb.	.08@.13	.12	.10½
Wiping cloths, 13¼x13¼, per lb	11.00	36.00 per M	.16
Wiping cloths, 13¼x20½, per lb		52.00 per M	.16
Sal soda, per 100 lb.	2.40	2.25	2.65
Roll sulphur, per 100 lb.	3.60	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.95	1.00	.94
Lard cutting oil (50 gal. bbl.) per gal	.55	.50	.67½
Machine lubricant, medium-bodied (50 gal. wooden bbl.), per gal.	.297	.35	.40
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 2c. per sq.in., per ply:			
Medium grade	30–10%	30–10%	30–10%
Heavy grade	20–5–2½	30%	20–5–2½%
Rubber and duck:			
First grade	50–10–5%	50–10%	40–10%
Second grade	60–5%	60–5%	60–5%
Abrasive materials—In sheets 9x11 in.,			
No. 1 grade, per ream of 480 sheets:			
Flint paper	$6.30	$5.84	$6.48
Emery paper	9.90	11.00	8.80
Emery cloth	31.12	31.12	29.48
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.49	1.24	1.40
Cloth	3.38	2.67	3.20
Fire clay, per 100 lb. bag		.65	.60
Coke, prompt furnace, Connellsville	per net ton		3.50@4.00
Coke, prompt foundry, Connellsville	per net ton		5.00@5.50
White lead, dry or in oil	100 lb. kegs		New York, 14.00
Red lead, dry	100 lb. kegs		New York, 14.00
Red lead, in oil	100 lb. kegs		New York, 15.50

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0354	$0.0354	$0.0304
Cold finished shafting	per lb.	0.0465	0.0465	0.039
Brass rods	per lb	0.155	0.1525	0.17
Solder (½ and ½)	per lb.	0.31	0.295	0.275
Cotton waste	per lb.	.10@.13	.10@.13	.09@.11½
Washers, cast iron (½ in.)	per 100 lb.	6.50	6.50	6.00
Emery, disks, cloth, No. 1, 6 in. dia.	per 100	3.38	3.38	3.02
Lard cutting oil	per gal.	0.55	0.55	0.60
Machine oil	per gal.	0.297	0.297	0.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts up to 1x30 in.	off list	40–10%	40–10%	40%

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	40–10%	60%	45–5%
1⅛ and 1¼x3 in. up to 12 in	15%	50–5%	50%
With cold punched hex. nuts up to 1 in. diam. (plus std. extra of 10%)	25–10%	$3.50 net	
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	30–10%	3.50 net	$4.00 off
Button head bolts, with hex. nuts	List net	List net	
Hex. head and hex. nut bolts	List net		65–5%
Lag screws, coach screws	40–10%		60–5%
Square and hex. head cap screws	60%	70%	70–10%
Carriage bolts, up to 1 in.x30 in.	30–10%	50%	40–5%
Bolt ends, with hot pressed nuts	40–10%		55%
Tap bolts, hex. head, list plus	35%		
Semi-finished nuts, 9/16 and smaller	60%		
Semi-finished nuts, ⅝ and larger	55%	70%	80%
Case-hardened nuts	40%		
Washers, cast iron, ½ in., per 100 lb. (net)	$6.50	$4.00	$3.50
Washers, cast iron, ⅝ in., per 100 lb. (net)	5.50	4.00	3.50
Washers, round plate, per 100 lb. Off list	1.50	4.00	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	0.50	3.50	2.50
Nuts, hot pressed, hex., per 100 lb. Off list	0.50	3.50	2.50
Nuts, cold punched, sq., per 100 lb. Off list	0.50	3.50	2.50
Nuts, cold punched, hex., per 100 lb. Off list	0.50	3.50	2.50
Rivets:			
Rivets, 7/16 in. dia. and smaller	50–10%	60%	60%
Rivets, tinned	50–10%	60%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb. (net)	$5.50	$3.60	$3.75
Cone heads, ditto (net)	5.60	3.80	3.85
1⅛ to 1¾-in. long, all diameters, *EXTRA* per 100 lb.	0.25		0.15
⅝ in. diameter *EXTRA*	0.15		0.15
½ in. diameter *EXTRA*	0.50		0.50
1 in. long, and shorter *EXTRA*	0.50		0.50
Longer than 5 in. *EXTRA*	0.25		0.25
Less than 200 lb. *EXTRA*	0.50		0.50
Countersunk heads *EXTRA*	0.35		$3.70 base

Pa., Monaca—F. Cancillo—refrigeration machinery for proposed $40,000 fruit and vegetable warehouse.

Pa., Sayre—J. Snyder, Route 1—complete machinery and equipment for sawmill (used preferred).

Pa., Scranton—Homemade Baking Co., 2229 Brown Ave.—machinery and equipment for proposed $10,000 addition to plant.

Tenn., Knoxville — Duncan Mchy. Co., Box 265—chain mortising machine and a No. 1½ Bolger & Kirsten shears (used).

Va., City Point—Wilson Hock Co. (machinery dealer)—5 ft. band sawmill.

Va., Wytheville—R. P. Johnson (machinery dealer)—jaw crusher.

W. Va., Philippi—Philippi Blanket Mills—six or eight Crompton & Knowles looms, 8 harness end cam, 4 x 1 box with 4 chain multipliers.

Wis., Appleton—C. Helm, 578 Locust St. (stone)—air compressor and two jib cranes.

Wis., Fond du Lac—E. C. Halverson, 105 South Main St.—bakery machinery, including electric ovens, mixers, etc.

Wis., Fond du Lac—B. F. & H. L. Sweet Mfg. Co., 245 West Arndt St.—small tools, woodworking machinery, etc., for the manufacture of heavy duty sleds.

Wis., Kenosha—Winther Motor Co., c/o R. D. Mock, Genl. Mgr.—miscellaneous tools and special machinery for the manufacture of motor trucks.

Wis., Madison—N. Olsen, 1928 Railroad St.—36 in. planer.

Wis., Madison—G. Ripp, 20 South Bassett St.—26 in. planer, bandsaws, circular saw, heavy rip saw and bench tools.

Wis., Madison—United States Automotive Shift Co., c/o B. R. L'Hommedieu, 252 West Gilman St.—special machines and tools for the manufacture of auto gear shift and metal specialties, for plant at Eau Claire.

Wis., Milwaukee—Milwaukee Paint & Varnish Co., 1503 Holton St.—one medium duty air compressor.

Wis., Milwaukee—Natl. Biscuit Co., 12 Erie St.—air compressor for proposed garage.

Wis., Sawyer—A. Behnke, R. D. (manufacturer of cheese and other dairy products)—one power churn, one separator, several vats, belting and shafting.

Wis., Watertown—W. C. Schultz, 603 Clyman St. (woodworking)—one veneer press, standard size.

B. C., Chemainus — Victoria Lumber & Mfg. Co.—complete machinery and equipment, to replace $25,000 fire loss.

B. C., New Westminster—United Shingle Mills, Ltd., J. McKercher, Purch. Agt.—machinery and equipment to replace fire loss.

B. C., Port Coquitlam—Hammond Cedar Milling Co., D. Hartnell, Purch. Agt.—machinery and equipment for $200,000 lumber mill.

N. S., Halifax—Newcombe & Tingley, H. W. Tingley, Purch. Agt.—polishing and cutting machinery for monumental works.

Ont., Cobalt—I. H. Rattray, Wallace Block—mining machinery.

Ont., London—Bd. Educ., A. N. Udy, Chn.—complete manual training equipment.

Ont., London—Western University, J. M. Moore, Archt., 489 Richmond St., Purch. Agt.—$50,000 worth of laboratory equipment.

Ont., Mitchell — Burritt Knitting Co. — knitting machinery and equipment.

Ont., Ottawa—Dept. of Public Wks., R. C. Derochers, Dept. Minister—machinery and equipment for grain elevator at Edmonton, Alta.

Ont., Ottawa — Dept. of Rys. & Canals, Parliament Bldgs.—hoists for canal at St. Catherines.

Ont., Sarnia—Sarnia Oil & Gas Co.—complete equipment for proposed $300,000 plant, daily capacity 5,000 gal. gasoline and 9,000 lb. of carbon black, at Medicine Hat, Alberta.

Ont., Sombra—H. P. Stover—complete equipment for grist mill, to replace that which was destroyed by fire.

Ont., Strathroy — Rathwell Baking Co.—complete equipment for bakery, to replace that which was destroyed by fire.

Ont., Windsor — Empire State Ice Co., Michigan Central Yards—three ice making machines, special refrigeration equipment, brine pumps, etc., to supply refrigerator cars.

Que., Amqui — J. A. Gagnon — general equipment for sawmill.

Que., Bourget—P. Hurtulise—complete blacksmith shop equipment.

Que., Montmagny — Courrier de Montmagny, A. Caron, Purch. Agt.—cutter and possibly job printing press.

Que., Montreal—J. Bradley, 192 Guy St.—emery stand, tools and equipment.

Que., Montreal — Canadian Automatic Machine Co., Ltd., L. C. Herdman, Dir., 4038 Dorchester St., W.—special equipment.

Que., Montreal—J. Lacasse Shoe Co., Ltd., c/o Z. Lacasse, 1771 Ave. de Chauteaubriaud—machinery and equipment.

Que., Montreal—Lee Puncture Proof Tire Co., c/o W. P. Creagh, 2048 Cartier St.—special machinery for the manufacture of pneumatic tires.

Que., Quebec—P. Noel, 28 Des Jardines St.—equipment for plumbing shop.

Que., Quebec—A. Rochette, 1 Racine St.—blacksmith shop equipment.

Que., Rimouski—L. Pelletier—equipment for sawmill.

Que., Rimouski—A. Sirois & Bro. (sawmill)—drum saw and self-feed rip saw.

Que., Ste. Claire — J. A. Roy — bakery equipment.

Que., St. Mathieu—E. Dionne—swing cut saw.

Metal Working Shops

Ark., Hot Springs—W. Dodson, 625 Central St., is having plans prepared for the construction of a 2 story garage and display room on Ouchita St. Estimated cost $40,000. S. M. Frank, Archt.

Calif., Eureka—A. Frisch, 231 E. St., plans to build a 1 story, 50x110 ft. garage on 4th and C Sts.

Calif., Los Angeles—C. A. Doody awarded the contract for the construction of a 4 story, 150 x 150 ft. garage on 6th and Kenmore Sts. Estimated cost $280,000.

Calif., San Francisco — The Amer. La France Fire Engine Co., Elmira, N. Y. (office of local representative, 151 New Montgomery St.), plans to build an assembling plant, office and service department, here. Estimated cost $150,000.

Calif., San Francisco—J. A. Nelson, Inc., 517 6th St., sheet metal works, is having plans prepared for the construction of a 1 story plant on 10th and Howard Sts. Estimated cost $40,000. H. A. Thomsen, Jr., 613 Sharon Bldg., San Francisco, Archt.

Conn., New Britain — The New Haven Dairy, Woodland St., awarded the contract for the construction of a 2 story, 50 x 50 ft. garage, etc. Estimated cost $40,000.

Conn., Torrington—The Allen Candy & Fruit Co., 33 East Main St., awarded the contract for the construction of a 1 story, 60 x 210 ft. garage and salesroom. Estimated cost $45,000.

Conn., Waterbury—P. Laskas, 1844 East Main St., will soon award the contract for the construction of a 1 story, 60 x 130 ft. garage on Meriden Rd. Estimated cost $40,000. F. L. Lauper, 16 Albion St., Waterbury, Archt. Noted Nov. 8.

Ind., Evansville — The Illinois Central R.R., 135 East 11th Pl., Chicago, is having plans prepared for an addition to shops, etc., at Harwood Yards, here. Estimated cost $750,000. F. L. Thompson, Ch. Engr.

Ind., Indiana Harbor—The Youngstown Sheet Tube Co., Stambaugh Bldg., Youngstown, O., plans to build two butt weld pipe mills and a blast furnace, here. Estimated cost $4,000,000. J. A. Campbell, Pres. Engineer or architect not announced.

Ia., Denison—G. W. Newcomb is having preliminary plans prepared for the construction of a 2 story, 80 x 150 ft. garage. Estimated cost $40,000. E. L. Barber, Denison, Archt.

Ky., Lexington — The Baker Car Co., Lafayette Bank Bldg., awarded the contract for the construction of a 1 story, 60 x 320 ft. automobile factory. Cost will exceed $25,000. Noted Oct. 4.

Ky., Louisville—The Standard Sanitary Mfg. Co., 6th and A Sts., awarded the contract for the construction of a 2 story addition to pattern shop and warehouse building. Estimated cost $50,000. Noted Nov. 1.

Ky., Louisville—The Standard Sanitary Mfg. Co., 6th and A Sts., plans to build a factory, foundry, etc., for the manufacture of brass plumbing fixtures on 6th and Shipp Sts. Estimated cost $1,500,000. Engineer or architect not selected.

Mich., Crystal Falls—The Webb Garage Co. will soon award the contract for the construction of a 1 story, 50 x 100 ft. garage. Estimated cost $40,000. F. E. Parmelee & Son, Iron Mountain, Archts.

Mich., River Rouge (Detroit P. O.)—The Ford Motor Co., Highland Park (Detroit P. O.), awarded the contract for the construction of a 1 story, 600 x 1,223 ft. and 2 story, 98 x 132 ft. addition to foundry and motors building, here.

Minn., Minneapolis — The Minneapolis Garage Co., 3411 Hennepin Ave., awarded the contract for remodeling a 9 story, 135 x 165 ft. manufacturing building into a garage on 2nd Ave. N. and 3rd St. C. D. Fintzell, Mgr. Estimated cost $100,000.

Minn., Minneapolis — The Rent-A-Ford Co., 7th St. and 2nd Ave. S., is having plans prepared for the construction of a 2 story, 50 x 140 ft. garage at 902 1st Ave. N. Estimated cost $45,000. P. Silver, Mgr. Ekman, Holm & Co., 302 Phenix Bldg., Minneapolis, Archts.

Mo., St. Louis—The Niedringhaus Metal Wares Co., 5700 Natural Bridge Ave., awarded the contract for the construction of a 2 story, 100 x 200 ft. factory for the manufacture of light metal wares at 5719 Natural Bridge Ave. Estimated cost $45,000.

Mo., St. Louis—The Warren Steel Casting Co., 3400 Maury Ave., is having revised plans prepared for the construction of a 1 story, 60 x 200 ft. steel foundry on Kingshighway. Estimated cost $60,000. O. J. Popp, Odd Fellows Bldg., St. Louis, Archt. Noted Sept. 6.

O., Cleveland—The Fixit Body & Fender Repair Co., c/o E. M. Hauserman, Secy., 2075 East 65th St., is having plans prepared for the construction of a 2 story addition to factory. Private plans. Estimated cost $50,000.

O., Cleveland—R. C. Patton and R. T. Hisey, 536 Engrs. Bldg., awarded the contract for the construction of a 1 story, 45 x 280 ft. garage at 1833 East 82nd St. Estimated cost $80,000. Noted Oct. 4.

O., Cleveland—Paul Bros. Co., 601 Fidelity Mortgage Bldg., is receiving bids for the construction of a 1 story, 110 x 160 ft. garage at 4320 Superior Ave. Estimated cost $50,000. J. F. Steffens, Fidelity Mortgage Bldg., Archt.

O., Toledo—The city plans to build a garage and repair shop. Estimated cost $160,000. A. Jackson, Service Dir.

Pa., Frankford (Phila. P. O.) — The Frankford Grocery Co., Inc., Penn and Unity Sts., is having plans prepared for the construction of a 1 story, 45 x 100 ft. garage, etc. W. E. S. Dyer, Land Title Bldg., Phila., Engr. and Archt.

Pa., Phila.—L. Friedman, Inc., Agent, 251 South 15th St., awarded the contract for the construction of a 1 story garage on Carlisle Ave. near Montgomery St. Estimated cost $97,600. Noted Nov. 1.

Pa., Williamsport — Mead & Goodrich, Inc., 350-370 West 3rd St., plans to build a 3 story, 120 x 170 ft. garage, sales building, show rooms and Ford Assembly plant. Estimated cost $140,000.

Tex., Big Spring—The Stokes Motor Co. awarded the contract for the construction of a 2 story, 50 x 140 ft. garage. Estimated cost $45,000.

W. Va., Huntington—The Motor Sales Co. plans to build a 1 story, 115 x 125 ft. automobile sales room and repair shop. Estimated cost $40,000.

Wis., East Troy—The Brown & O'Malley Co. plans to build a 2 story, 48 x 80 ft. garage on Main and Brown Sts. Estimated cost $40,000. Engineer or architect not selected.

Wis., Hurley—The Norman Auto Co. will build a 1 story, 95 x 100 ft. garage and repair shop. Estimated cost $40,000. B. E. Norman, Pres. Noted Nov. 1.

Wis., Kenosha—The Central Fuel & Ice Co., 159 South Ridge St., will build a 1 story, 57 x 100 ft. garage. Estimated cost $40,000.

Wis., Ladysmith—The Arts & Diedrich Co. will build a 2 story, 50 x 90 ft. garage and repair shop. Estimated cost $40,000.

Wis., Milwaukee—The Eslien Sheet Metal Wks., 1001 30th St., is having plans prepared and will soon receive bids for the construction of a 3 story, 60 x 120 ft. factory. Estimated cost $60,000. C. F. Behnke, 827 34th St., Milwaukee, Archt.

Wis., Milwaukee—The Luick Ice Cream Co., 183 Ogden Ave., awarded the contract for the construction of a 4 story, 120 x 120 ft. garage on Van Buren St. Estimated cost $180,000. Noted Oct. 25.

Wis., Milwaukee—The Milwaukee Electric Ry. & Light Co., Public Service Bldg., awarded the contract for the construction of a 1 story, 60 x 100 ft. garage on 38th St. Estimated cost $40,000. Noted Oct. 25.

Wis., Racine—F. H. Applegate, 1043 Washington Ave., awarded the contract for the construction of a 1 story, 100 x 174 ft. garage. Estimated cost $55,000. Noted Aug. 16.

Wis., Waukesha—The Thompson Malted Food Co., Riverside Dr., awarded the contract for the construction of a 1 story, 52 x 100 ft. garage. Estimated cost $40,000. Noted Nov. 8.